# SHARP SERVICE MANUAL

CODE : 00ZXEA20SUSME

## ELECTRONIC CASH REGISTER

## MODEL XE-A20S

**(U version)**

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Parts marked with "⚠" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

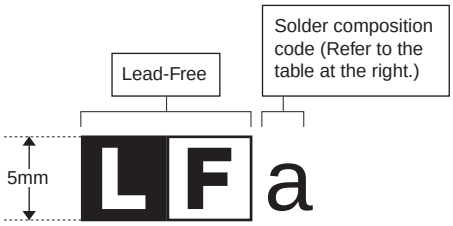

**SHARP CORPORATION**

This document has been published to be used for after sales service only.
The contents are subject to change without notice.

# LEAD-FREE SOLDER

The PWB's of this model employs lead-free solder. The "LF" marks indicated on the PWB's and the Service Manual mean "Lead-Free" solder.
The alphabet following the LF mark shows the kind of lead-free solder.

**Example:**




**<Solder composition code of lead-free solder>**

| Solder composition | Solder composition code |
|---|---|
| Sn-Ag-Cu | a |
| Sn-Ag-Bi<br>Sn-Ag-Bi-Cu | b |
| Sn-Zn-Bi | z |
| Sn-In-Ag-Bi | i |
| Sn-Cu-Ni | n |
| Sn-Ag-Sb | s |
| Bi-Sn-Ag-P<br>Bi-Sn-Ag | p |

## (1) NOTE FOR THE USE OF LEAD-FREE SOLDER THREAD

When repairing a lead-free solder PWB, use lead-free solder thread. Never use conventional lead solder thread, which may cause a breakdown or an accident.

Since the melting point of lead-free solder thread is about 40°C higher than that of conventional lead solder thread, the use of the exclusive-use soldering iron is recommendable.

## (2) NOTE FOR SOLDERING WORK

Since the melting point of lead-free solder is about 220°C, which is about 40°C higher than that of conventional lead solder, and its soldering capacity is inferior to conventional one, it is apt to keep the soldering iron in contact with the PWB for longer time. This may cause land separation or may exceed the heat-resistive temperature of components. Use enough care to separate the soldering iron from the PWB when completion of soldering is confirmed.

Since lead-free solder includes a greater quantity of tin, the iron tip may corrode easily. Turn ON/OFF the soldering iron power frequently.

If different-kind solder remains on the soldering iron tip, it is melted together with lead-free solder. To avoid this, clean the soldering iron tip after completion of soldering work.

If the soldering iron tip is discolored black during soldering work, clean and file the tip with steel wool or a fine filer.

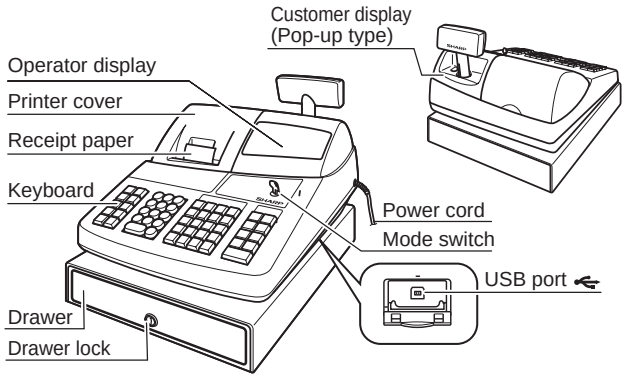
**CAUTIONS**

THERE IS A RISK OF EXPLOSION IF THE BATTERY
IS REPLACED BY AN INCORRECT TYPE.
PROPERLY DISPOSE OF USED BATTERIES ACCORDING
TO THE INSTRUCTIONS.

# CHAPTER 1. SPECIFICATIONS

## 1. APPEARANCE

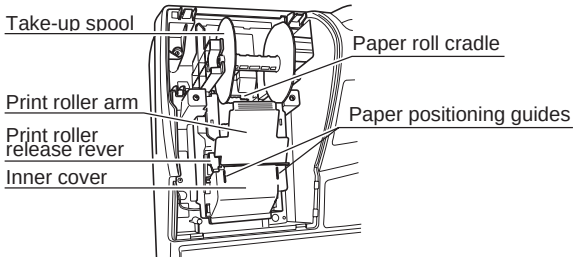
■Front view




■Rear view




■Printer




## 2. RATING

| | XE-A20S |
|---|---|
| Weight | 16.3lb (7.4kg) |
| Dimensions | 13.0 (W) x 16.9 (D) x 11.0 (H) inches<br>(330 (W) x 428 (D) x 280 (H) mm) |
| Power source | AC 120V (±10%), 60Hz |
| Power consumption | Stand-by 7.7W, Operating 30W (max.) |
| Working temperature | 32°F to 104°F (0°C~40°C) |

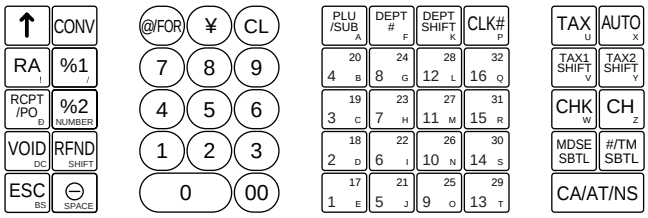
## 3. KEYBOARD

### 1) KEYBOARD LAYOUT

| | |
|---|---|
| Type | Normal keyboard |
| Key position | Std/Max 53keys |
| Key pitch | 19 (W) x 19 (H) mm |
| Key layout | Fixed type |

### 2) KEY LIST

■**Keyboard layout**




Note: The small characters on the bottom or lower right in each key indicates functions or characters which can be used for character entries for text programming.

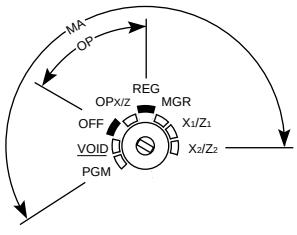
■**Key names**

| KEY TOP | DESCRIPTION |
|---|---|
| ↑ | Paper feed key |
| RA | Received-on account key |
| RCPT/PO | Receipt print/Paid-out key |
| VOID | Void key |
| ESC | Escape key |
| CONV | Conversion key |
| %1, %2 | Percent 1and 2 key |
| RFND | Refund key |
| ⊖ | Discount key |
| @/FOR | Multiplication key |
| • | Decimal point key |
| CL | Clear key |
| 0-9,00 | Numeric Keys |
| PLU/SUB | PLU/Subdepartment key |
| DEPT# | Department code entry key |
| DEPT SHIFT | Department shift key |
| CLK# | Clerk code entry key |
| Dept1-32 | Department keys |
| TAX | Tax key |
| Tax 1 SHIFT | Tax 1 shift key |
| Tax 2 SHIFT | Tax 2 shift key |
| AUTO | Automatic sequence key |
| CHK | Check key |
| CH | Charge key |
| MDSE SBTL | Merchandise subtotal key |
| #/TM/SBTL | Non-add code/Time display/Subtotal key |
| CA/AT/NS | Total/Amount tender/Non Sale key |

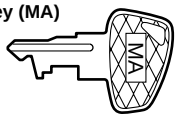
## 4. MODE SWITCH

### 1) LAYOUT

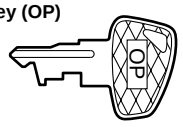
• Rotary type




**Manager key (MA)**




**Operator key (OP)**




The mode switch can be operated by inserting one of the two supplied mode keys - manager (MA) and operator (OP) keys. These keys can be inserted or removed only in the “REG” or “OFF” position.

The mode switch has these settings:

**OFF:** This mode locks all register operations. (AC power turns off.) No change occurs to register data.

**OP X/Z:** To take individual clerk X or Z reports, and to take flash reports.
It can be used to toggle receipt state “ON” and “OFF” by pressing he [RCPT/PO] key.

**REG:** For entering sales.

**PGM:** To program various items.

**VOID:** Enters into the void mode. This mode allows correction after finalizing a transaction.

**MGR:** For manager’s entries. The manager can use this mode for an override entry.

**X1/Z1:** To take the X/Z report for various daily totals.

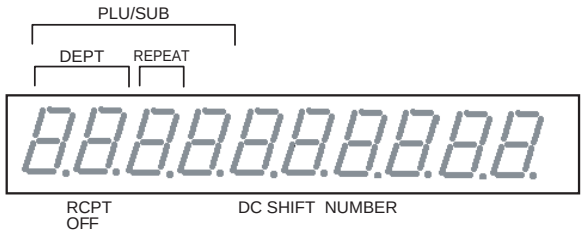
**X2/Z2:** To take the X/Z report for periodic (weekly or monthly) consolidation.

# 5. DISPLAY

## 1) OPERATOR DISPLAY

| | |
|---|---|
| Display device: | LED |
| Number of line: | 1 line |
| Number of positions: | 10 digits |
| Color of display: | Yellow / Green |
| Character form: | 7 segment |
| Character size: | Numeric 14 (H) x 8 (W) mm |

**Layout:**

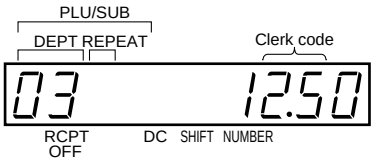



## 2) CUSTOMER DISPLAY

| | |
|---|---|
| Display device: | LED |
| Number of line: | 1 line |
| Number of positions: | 7 digits |
| Color of display: | Yellow / Green |
| Style: | Pop up type |
| Character form: | 7 segment |
| Character size: | 14mm (H) x 8mm (W) |

**Layout:**

**▫ Operator display**




**▫ Customer display (Pop-up type)**

**Amount:** Appears in the far-right eight (max.) positions. When the amount is negative, the minus symbol “-” appears before the amount.

**Number of repeats for repetitive registrations:**

The number of repeats is displayed, starting at “2” and incremental with each repeat. When you have registered ten times, the display will show “0.” (2 → 3 ···· 9 → 0 → 1 → 2 ···)

**Receipt function status:**

The indicator “_” appears in the RCPT OFF position when the receipt function is in the OFF status.

**Time:** Appears in the far-right six positions (hour-minute - ”A” or hour-minute - ”P”) in the OP X/Z, REG, or MGR mode. “A” is displayed in the morning (AM), and “P” in the afternoon (PM). In the REG or MGR mode, press the [#/TM/SBTL] key to display the time.

### ■Machine state symbols

P : Appears during programming.

E : Appears when an error is detected.

o : Appears when the subtotal is displayed or when the amount tendered is smaller than the sales amount.

c : Appears when the [CONV] key is pressed to calculate a subtotal in foreign currency.

F : Appears when a transaction is finalized by pressing the [CA/AT/NS], [CHK] or [CH] key.

C : Appears when the change due amount is displayed.

E-E : May appear in the far-left three positions at the timing of key entry when the electronic journal (EJ) memory is full. (Depending on programming.)

L : Appears when the voltage of the installed batteries is under the required level. You must replace with new ones within two days to avoid loss of memory.

L : Appears when the batteries are not installed, or the installed batteries are dead. You must replace with new ones immediately.

• : May appear right below the eighth and ninth places at the timing of finalization of a transaction when the electronic journal (EJ) memory is nearly full.
Also appears right below the tenth place when power save mode is effective.

H : Appears when the print roller arm is not locked.

PPPPPPPPPP : Appears when the paper is not installed or paper is out.

**Segment**

| | Display position | Description |
|---|---|---|
| Amount | 1-8 | |
| Minus sign | 2-10 | -: Floating |
| Error | 8-10 | Exx:xx = error code |
| PGM Mode | 10 | P |
| CASH, CHECK, CHARGE | 10 | F: Light up when a registration is finalized by depressing CASH, CHECK, CHARGE key |
| SUB TOTAL/ short tender | 10 | o |
| Change | 10 | C: Light up whenever the change due amount appears in the display. |
| Currency Conversion | 10 | c: Light up whenever the foreign amount appears in the display. |
| Department | 9-10 | No zero-suppressed |
| PLU | 7-10 | No zero-suppressed |
| Repeat | 8 | Endless count, starting from 2. |
| Receipt OFF | 9 | _ |
| DC | | _: Double size character entry status |
| SHIFT | | _: Shift character entry status |
| NUMBER | | _: Number character entry status |
| Clerk No. | 2, 3 | -xx-: clerk number |
| EJ FULL | 8-10 | E-E: Light up when EJ memory is FULL at the timing of key entry (by PGM selection). |
| Low Battery | 10 | L: |
| No Battery | 10 | $_L$: |

**Decimal Point**

| | Display position | Description |
|---|---|---|
| Decimal point | 7-1 | |
| TAB | 4-1 | |
| EJ near full | 8, 9 | (by PGM selection) |

# 6. PRINTER

## 1) Printer

- Part number : M-T53II
- No. of station : 1 (Receipt or journal)
- Validation : No.
- Printing system : Line thermal
- No. of dot : 288 dots
- Dot pitch : Horizontal 0.167mm
  Vertical 0.167mm
- Font : 10 dots (W) x 24 dots (H)
- Printing capacity : max. 24 characters/Line
- Character size : 1.67mm (W) x 4.00mm (H) at 10 x 24 dots
- Print pitch : Column distance 2.0mm
  Row distance 5.21mm
- Print speed : Approximate 60mm/s (Approximate 12 l/s)
- Paper feed speed : Approximate 60mm/s (Approximate 12 l/s)
- (Manual feed) : Approximate 60mm/s (Approximate 12 l/s)
- Reliability : Mechanism LIFE 6 million lines used to high quality thermal paper
- Paper end sensor : Set up
- Cutter : Manual Cutter
- Near end sensor : No

## 2) Paper

- Paper roll dimension: 2.25 ± 0.02 inch
  57.5 ± 0.5mm in width
  Max. 3.15 inch
  Max. 80mm in diameter
- Paper quality: High-quality thermal paper

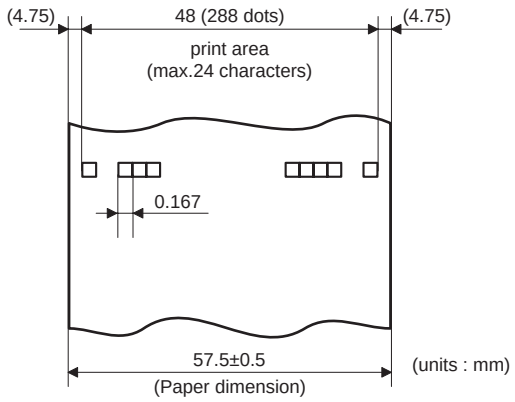
| | |
|---|---|
| paper thickness: | 0.06 to 0.08mm |
| Nihon seisi thermal paper | TF50KS-E2C |
| KANZAN thermal paper: | KF50 |
| KSP thermal paper: | P350 |

## 3) Logo stamp

- No

## 4) Printing area

Number of thermal head heater elements 288 dots



# 7. DRAWER

## [OUTLINE]

- Standard equipment: Yes (1)
- Max. number of additional drawers: 0
- The drawer consists of:
  1) Drawer box (outer case) and drawer
  2) Money case
  3) Coin case
  4) Lock (attached to the drawer)

## [SPECIFICATION]

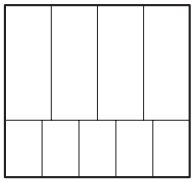
### 1) DRAWER BOX AND DRAWER

- Model name of the drawer box : SK-415
- Size : 330 (W) x 418 (D) x 98 (H) mm
  13 (W) x 16.5 (D) x 3.9 (H) inch
- Material : Metal
- Bell : –
- Release lever : Standard equipment:
  locate on the bottom
- Drawer open sensor : –
- Separation from the main unit : –

### 2) MONEY CASE

| | |
|---|---|
| Separation from the drawer | Disallowed |
| Separation of the bill compartments from the coin compartments | Allowed |
| Bill separator | – |
| Number of compartments | 4B/5C |

**Layout:**



4B/5C

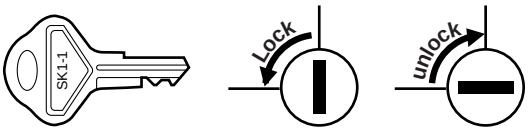
### 3) LOCK (LOCK KEY : LKGIM7331BHZZ)

Location of the lock: Front

Method of locking and unlocking:

To lock, insert the drawer lock key into the lock and turn it 90 degrees counter clockwise.
To unlock, insert the drawer lock key and turn it 90 degrees clockwise.

Key No: SK1-1




# 8. BATTERY

### 1) MEMORY BACK UP BATTERY

For memory back up, (3) dry AA batteries are needed.

1. Memory holding time:

   Approx. 1 year after NEW dry batteries are installed.

2. Battery replacement method:

   When the low battery symbol “L” lights up, replace the batteries (3 AA) by the following method;

   1) Power on the ECR.
   2) Mode switch turn to “REG” mode.
   3) Remove the OLD dry batteries (3 pieces).
   4) Insert the NEW dry batteries (3 pieces).
   5) Confirm the low battery symbol “L” is off.

### 2) LOW BATTERY

Low battery indication will appear on the left side of display when the battery voltage is low.

**CASE 1:** When machine is sitting idle or after finalization of a transaction.

The machine will always indicate the low battery condition.

**CASE 2:** During any numeric or item key entry.

Battery condition will not appear.
Except when the power is restored after a power failure, the low battery condition will appear on the display only when the battery is low and the indicator will disapear after any key entry.

**[Display sample]**

“ 0.00”: Battery is OK.

“L 0.00”: Low battery (You have to change the batteries.)

“L 0.00”: No battery (You have to change the batteries immediately.)

After finalization

“F 12.34”: Battery is OK.

“L 12.34”: Low battery. (“L” indicate instead of “F”.)

“L 12.34”: No battery. (“L” indicate instead of “F”.)

Note: “NO BATTERY”: When “NO BATTERY” is displayed, the master reset is executed upon "POWER ON" after "POWER OFF" or power failure.

# CHAPTER 2. OPTIONS

## 1. OPTIONS (NONE)

## 2. SERVICE TOOL

| NO | NAME | PARTS CODE | PRICE RANK | DESCRIPTION |
|---|---|---|---|---|
| 1 | USB cable | | | For connection between ECR and PC |

## 3. SUPPLIES

| NO | NAME | PARTS CODE | PRICE RANK | DESCRIPTION |
|---|---|---|---|---|
| 1 | Thermal roll paper | TPAPR6656RC05 | BA | 5 ROLLS/PACK |

# CHAPTER 3. MASTER RESET AND PROGRAM RESET

## 1. MASTER RESETTING

Master resetting clears the entire memory and resumes default values.

Master resetting can be accomplished by using the following procedure:

Procedure:
1) Plug in the AC cord to the wall outlet.
2) Set the mode switch to REG position.
3) Remove the 3 AA batteries.
4) Unplug the AC cord from the wall outlet.
5) Wait over 1 minute for discharging.
6) Plug in the AC cord to the wall outlet.
7) Install the 3 AA batteries.

Note: The master reset can also be accomplished in the following case.
In case a power failure occurs when the machine has no batteries installed, the master reset operation is automatically performed after the power has been restored.
When power failure occurs with no batteries installed in the the machine, all memory is lost and the machine does not work properly after power is restored, thus requiring the master reset operation.)

## 2. PROGRAM RESETTING (INITIALIZATION)

This resetting resumes the initial program without clearing memory.

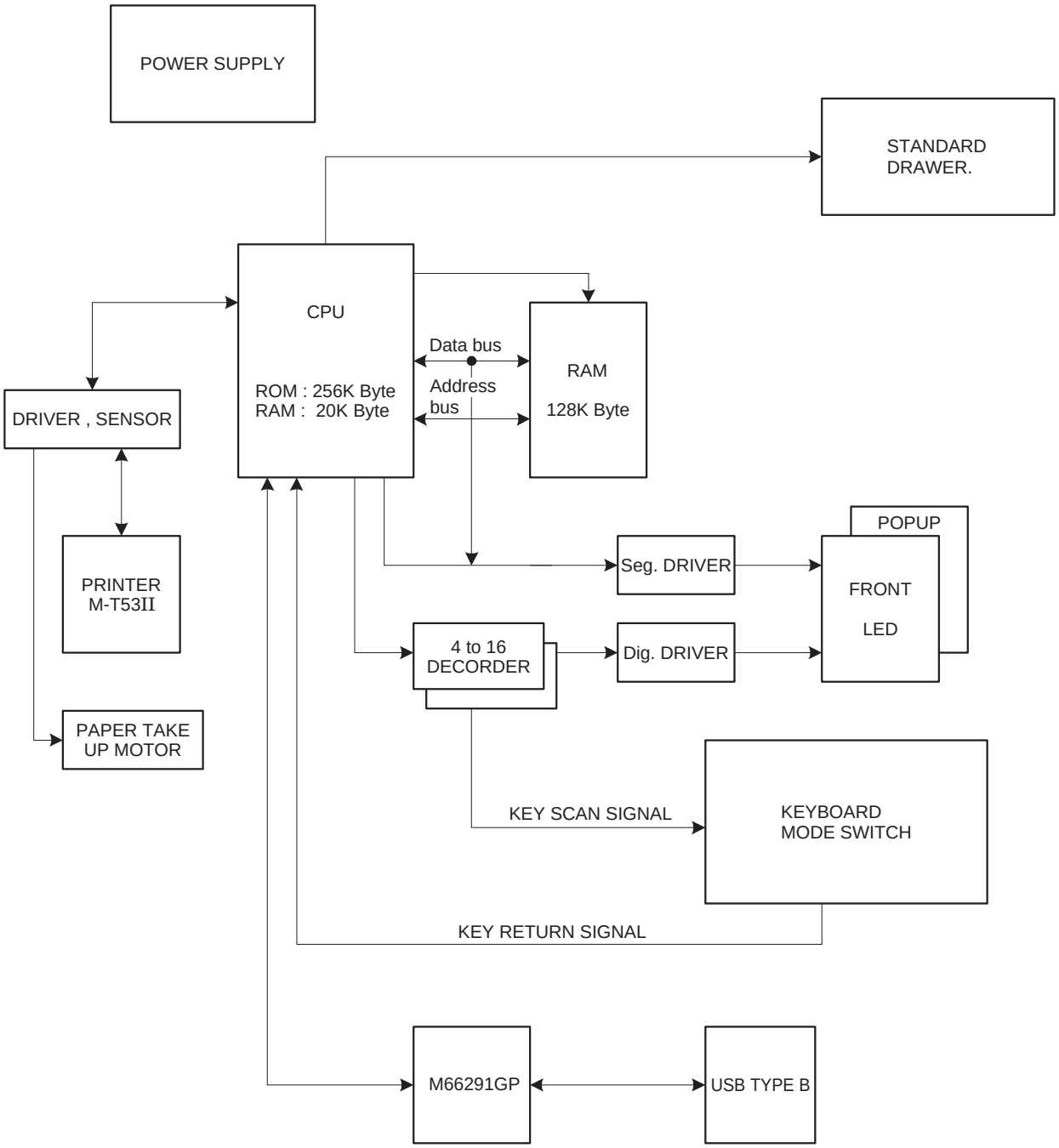
This resetting can be operated at below sequence in PGM mode.

Procedure:
1) Unplug the AC cord from the wall outlet.
2) Wait over 1 muinite for discharging.
3) Set the mode switch to the PGM position.
4) While holding down the FEED key, plugin the AC cord to the wall outlet.

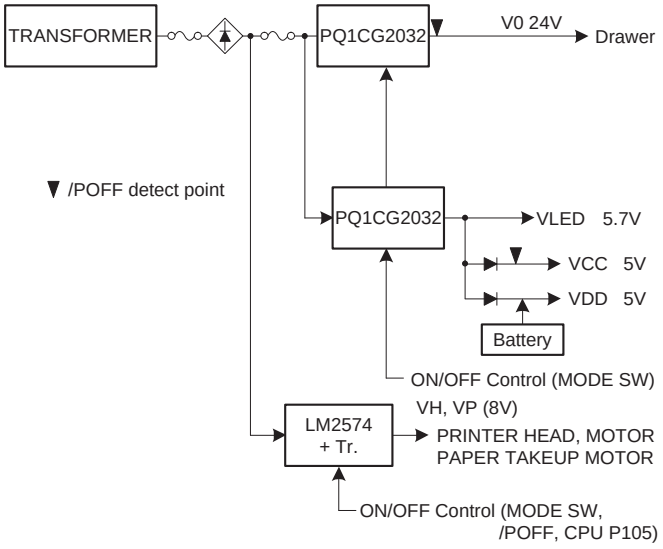
Note: In case a power failure occurs when the machine has no batteries installed, the master reset operation is automatically performed after the power has been restored.

# CHAPTER 4. HARDWARE DESCRIPTION

## 1. HARDWARE BLOCK DIAGRAM



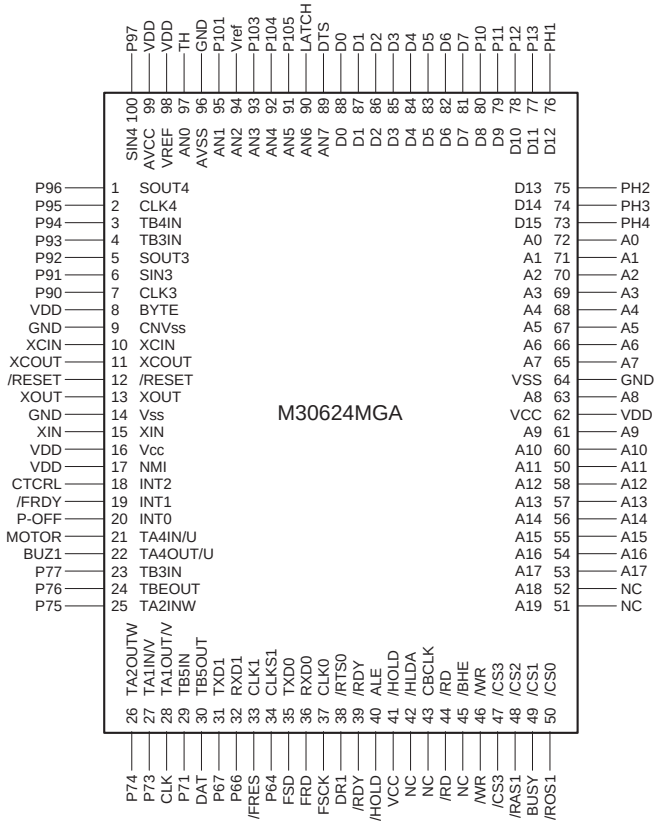

| | |
|---|---|
| CPU | : RENESAS 30624 (MASK) (ROM 256KB RAM 20KB) |
| EXTERNAL MEMORY | : RAM 128 KB |
| PRINTER | : EPSON M-T53II 1SHEET |
| USB CONTROLLER | : RENESAS M66291FP |




# 2. DESCRIPTION OF MAIN LSI'S

## 2-1. CPU (M30624MGA)

### 1) Pin configuration




### 2) Pin description

M16C/62 PORT

MEMORY SPACE : MEMORY PROCESSOR MODE (NORMAL MODE)

PROCESSOR MODE : MEMORY PROCESSOR MODE It is used by (SEPARATE BUS 8bit Width)

| PORT | PIN No. | I/O | Pin name | Signal name | Initial value | OFF MODE | Function |
|---|---|---|---|---|---|---|---|
| P00 | 88 | I/O | D0 | D0 | | OUT L | |
| P01 | 87 | I/O | D1 | D1 | | OUT L | |
| P02 | 86 | I/O | D2 | D2 | | OUT L | |
| P03 | 85 | I/O | D3 | D3 | | OUT L | |
| P04 | 84 | I/O | D4 | D4 | | OUT L | |
| P05 | 83 | I/O | D5 | D5 | | OUT L | |
| P06 | 82 | I/O | D6 | D6 | | OUT L | |
| P07 | 81 | I/O | D7 | D7 | | OUT L | |
| P10 | 80 | O | P10 | KST0 | L | IN | KEY DISPLAY (4 to 16) |
| P11 | 79 | O | P11 | KST1 | L | IN | KEY DISPLAY (4 to 16) |
| P12 | 78 | O | P12 | KST2 | L | IN | KEY DISPLAY (4 to 16) |
| P13 | 77 | O | P13 | KST3 | L | IN | KEY DISPLAY (4 to 16) |
| P14 | 76 | O | P14 | IN1 | L | OUT L | PAPER FEED MOTOR |
| P15 | 75 | O | P15 | IN2 | L | OUT L | PAPER FEED MOTOR |
| P16 | 74 | O | P16 | ENA1 | L | OUT L | PAPER FEED MOTOR |
| P17 | 73 | O | P17 | ENA2 | L | OUT L | PAPER FEED MOTOR |
| P20 | 72 | O | A0 | A0 | | OUT L | |
| P21 | 71 | O | A1 | A1 | | OUT L | |
| P22 | 70 | O | A2 | A2 | | OUT L | |
| P23 | 69 | O | A3 | A3 | | OUT L | |
| P24 | 68 | O | A4 | A4 | | OUT L | |
| P25 | 67 | O | A5 | A5 | | OUT L | |
| P26 | 66 | O | A6 | A6 | | OUT L | |
| P27 | 65 | O | A7 | A7 | | OUT L | |
| P30 | 63 | O | A8 | A8 | | OUT L | |
| P31 | 61 | O | A9 | A9 | | OUT L | |
| P32 | 60 | O | A10 | A10 | | OUT L | |
| P33 | 59 | O | A11 | A11 | | OUT L | |
| P34 | 58 | O | A12 | A12 | | OUT L | |
| P35 | 57 | O | A13 | A13 | | OUT L | |
| P36 | 56 | O | A14 | A14 | | OUT L | |
| P37 | 55 | O | A15 | A15 | | OUT L | |
| P40 | 54 | O | A16 | A16 | | OUT L | |
| P41 | 53 | O | A17 | A17 | | OUT L | |
| P42 | 52 | O | A18 | A18 | | OUT L | |
| P43 | 51 | O | A19 | A19 | | OUT L | |
| P44 | 50 | O | /CS0 | (NU) | L | OUT L | |
| P45 | 49 | O | /CS1 | /CS1 | | OUT L | USB CONTROLLER |
| P46 | 48 | O | /CS2 | /CS2 | | OUT L | SRAM |
| P47 | 47 | O | /CS3 | /CS3 | | OUT L | SEGMENT LATCH |
| P50 | 46 | O | /WR | /WR | | OUT L | |
| P51 | 45 | O | /BHE | (NU) | | OUT L | |
| P52 | 44 | O | /RD | /RD | | OUT L | |
| P53 | 43 | O | BCLK | BCLK | | OUT L | |
| P54 | 42 | O | /HLDA | (NU) | | OUT L | |

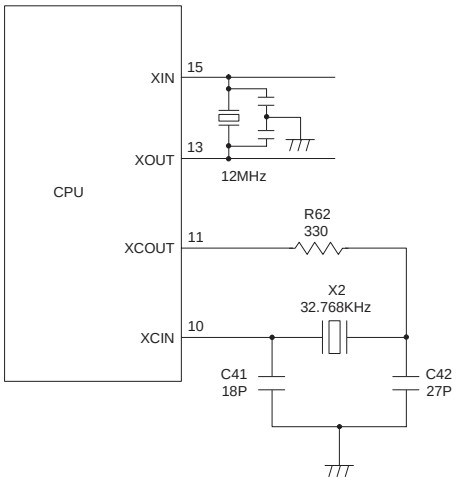
| PORT | PIN No. | I/O | Pin name | Signal name | Initial value | OFF MODE | Function |
|---|---|---|---|---|---|---|---|
| P55 | 41 | I | /HOLD | /EPM | | IN | |
| P56 | 40 | O | ALE | (NU) | | OUT L | |
| P57 | 39 | I | /RDY | /RDY | | IN | |
| P60 | 38 | O | P60 | DR1 | L | OUT L | DRAWER 1 DRIVE SIGNAL |
| P61 | 37 | O | P61 | (NU) | L | OUT L | |
| P62 | 36 | O | P62 | (NU) | L | OUT L | |
| P63 | 35 | O | P63 | /USBRST | L | OUT L | USB CONTROLLER RESET |
| P64 | 34 | O | P64 | /BUSY | L | OUT L | BOOT BUSY |
| P65 | 33 | I | P65 | SCLK | | IN | BOOT SCLK |
| P66 | 32 | I | P66 | RXD | | IN | BOOT RXD |
| P67 | 31 | O | P67 | TXD | L | OUT L | BOOT TXD |
| P70 | 30 | O | TXD2 | DAT | H | OUT L | PRINTER DATA OUT |
| P71 | 23 | O | P71 | (NU) | L | OUT L | |
| P72 | 28 | O | CLK2 | CLK | L | OUT L | PRINTER CLOCK |
| P73 | 27 | O | P73 | DR2 | L | OUT L | DRAWER 2 DRIVE SIGNAL |
| P74 | 26 | O | P74 | (NU) | L | OUT L | |
| P75 | 25 | O | P75 | (NU) | L | OUT L | |
| P76 | 24 | O | P76 | (NU) | L | OUT L | |
| P77 | 23 | O | P77 | /EPM CTRL | H | OUT L | |
| P80 | 22 | O | P80 | BUZZER | L | OUT L | BUZZER |
| P81 | 21 | O | P81 | MOTOR | L | OUT L | PAPER TAKE UP MOTOR |
| P82 | 20 | I | /INT0 | POFF | | IN | POWER INTERRUPT |
| P83 | 19 | I | /INT1 | /DREQUSB | | IN | USB DMA REQUEST |
| P84 | 18 | I | /INT2 | /INTUSB | | IN | USB INTERRUPT |
| P85 | 17 | I | /NMI | (NU) | | IN | |
| P86 | 11 | O | XCOUT | XCOUT | | | 32.768kHz |
| P87 | 10 | I | XCIN | XCIN | | | 32.768kHz |
| P90 | 7 | I | P90 | P90 | | IN | KEY IN |
| P91 | 6 | I | P91 | P91 | | IN | KEY IN |
| P92 | 5 | I | P92 | P92 | | IN | KEY IN |
| P93 | 4 | I | P93 | P93 | | IN | KEY IN |
| P94 | 3 | I | P94 | P94 | | IN | KEY IN |
| P95 | 2 | I | P95 | P95 | | IN | KEY IN |
| P96 | 1 | I | P96 | P96 | | IN | KEY IN |
| P97 | 100 | I | P97 | P97 | | IN | KEY IN |
| P100 | 97 | I | AN0 | P100 | | IN | HEAD TEMPERA-TURE MONITOR |
| P101 | 95 | I | AN1 | P101 | | IN | HEAD VOLTAGE MONITOR |
| P102 | 94 | O | P102 | /STB2 | H | OUT L | PRINTER/STB2 |
| P103 | 93 | I | AN3 | VBAT | | IN | BATTERY VOLTAGE |
| P104 | 92 | O | P104 | (NU) | L | OUT L | |
| P105 | 91 | O | P105 | VPON | L | OUT L | PRINTER HEAD POWER |
| P106 | 90 | O | P106 | /LAT | H | OUT L | PRINTER DATA LATCH |
| P107 | 89 | O | P107 | /STB1 | H | OUT L | PRINTER /STB1 |

**<Power supply/CONTROL pins>**

| PORT | PIN No. | I/O | Signal name | Function |
|---|---|---|---|---|
| BYTE | 8 | I | BYTE | Connected to VDD |
| CNVss | 9 | I | CNVss | NORMAL: L<br>Launch BOOT: H |
| /RESET | 12 | I | /RESET | |
| Xout | 13 | O | Xout | OPEN |
| Vss | 14 | | Vss | Connected to GND |
| Xin | 15 | I | Xin | Connected to Spectram diffusion IC |
| Vcc | 16 | | Vcc | Connected to VDD |
| Vcc | 62 | | Vcc | Connected to VDD |
| Vss | 64 | | Vss | Connected to GND |
| AVss | 96 | | AVss | Connected to GND |
| Vref | 98 | | Vref | Connected to VDD |
| AVcc | 99 | | AVcc | Connected to VDD |

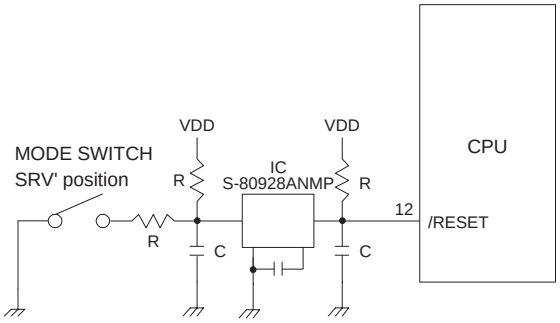
## 3. CLOCK GENERATOR

### 1) CPU




Two oscillators are connected to the CPU.
The basic clock X2 is supplied from a 12MHz oscillator.
If the CPU was not operating properly, the signal does not appear on this line in most cases.
The sub-clock X1 generates 32.768KHz which is primarily used to update the internal RTC (real time clock).
During the standby mode, it keeps oscillating to update the clock and monitoring the power recovery.

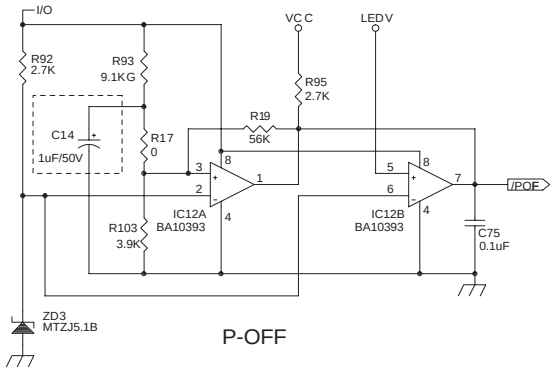
## 4. RESET CIRCUIT




(1) When the mode switch is placed in the “SRV” position, the reset signal is sent to the CPU to reset the hardware.

(2) When VDD ≦ 2.8V, a reset signal is sent from the reset IC. (S-80928ANMP)

## 5. P-OFF CIRCUIT



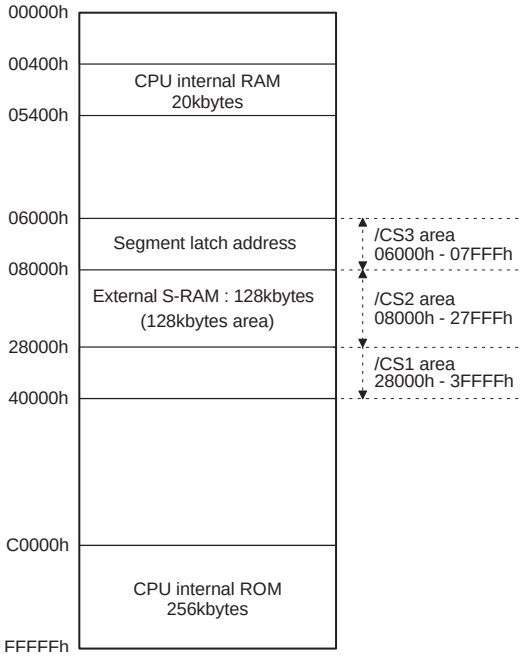

The P-OFF signal detects two signals by two comparators and sent to the CPU.

V0 (24V) signal: If the power voltage V0 (24V) falls bellow the specified level, the P-OFF signal is driver to LOW by the comparator IC12A.

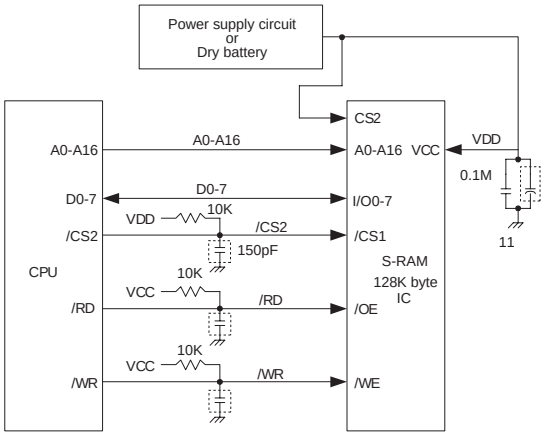
VLED signal: If the LED/Logic power voltage VLED falls below the specified level, the P-OFF signal is driven to LOW by the comparator IC12B.

## 6. MEMORY CIRCUIT

### 1) Address map

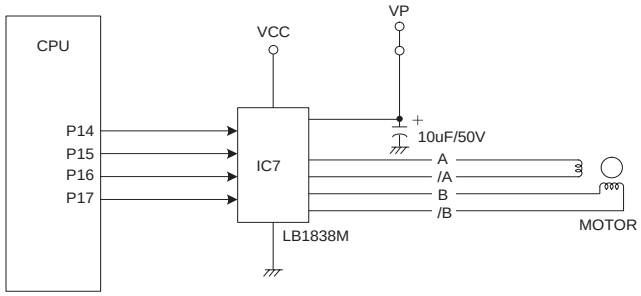



### 2) RAM control




## 7. PRINTER CONTROL CIRCUIT

### 1) Paper feed motor circuit




Stepping motor control

The 2-phase, bi-polar stepping motor is driven at a constant voltage by LB1838M (made by SANYO).

1 step: 0.087mm

1 dot: 2 steps

**CPU port**

| No. | CPU port | Signal used |
|---|---|---|
| 76 | P14 | IN1 |
| 75 | P15 | IN2 |
| 74 | P16 | ENA1 |
| 73 | P17 | ENA2 |

**Drive step**

| | Driver IC input (CPU output) | | | | Motor drive signal | | | |
|---|---|---|---|---|---|---|---|---|
| STEP | IN1 | IN2 | ENA1 | ENA2 | A (OUT1) | B (OUT3) | /A (OUT2) | /B (OUT4) |
| 1 | L | L | H | H | H | H | L | L |
| 2 | H | L | H | H | L | H | H | L |
| 3 | H | H | H | H | L | L | H | H |
| 4 | L | H | H | H | H | L | L | H |

### 2) Print circuit

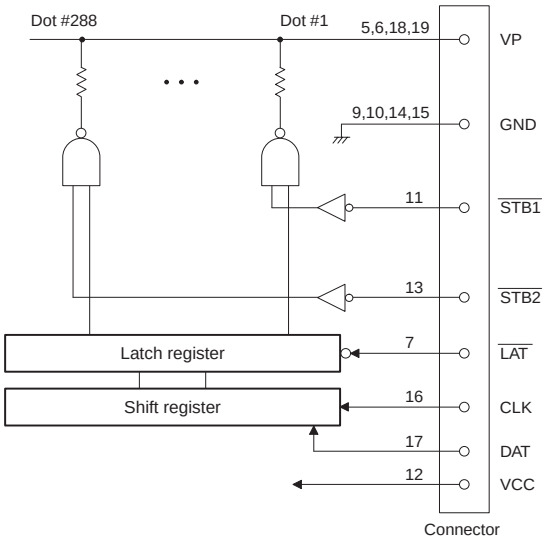
**Thermal head configuration**

Figure on next page shows the circuit of the thermal head consists of heating elements and head drivers which drives and controls the heating elements.

The serial print data input through the DATA IN (DAT) is transferred to the shift register synchronizing with the CLOCK (CLK) and stored in the latch register by the LATCH (LAT) signal.

The head conduction signals (print commands 1 ~ 6) turn the gate on to conduct the heating element corresponding to the print data.

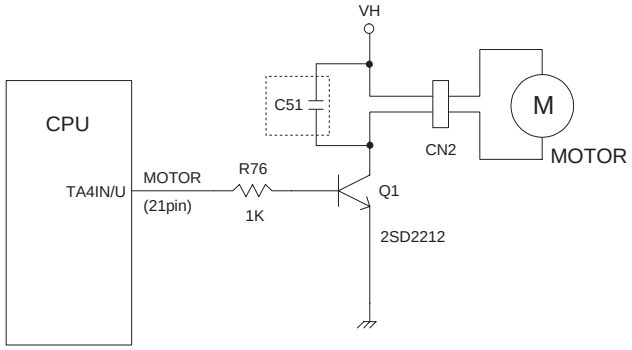
**Thermal head block diagram**




**Thermal head strobe terminals**

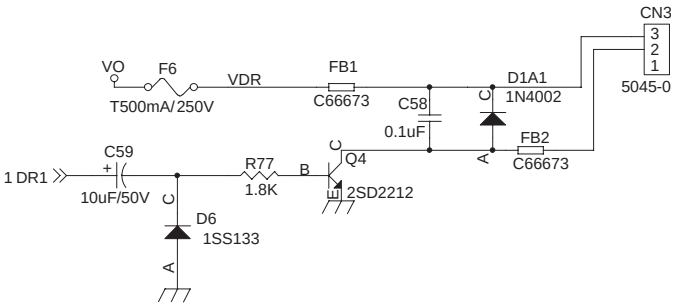
| STB No. | Dot No. | Number of dots |
|---|---|---|
| 1 | 1 ~ 144 | 144 |
| 2 | 145 ~ 288 | 144 |

## 8. PAPER TAKE UP MOTOR DRIVE CIRCUIT



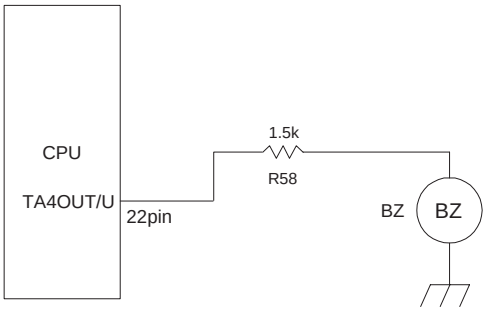

When the MOTOR signal from the CPU is HIGH, Q1 is turned on to operate the motor.

## 9. DRAWER DRIVE CIRCUIT



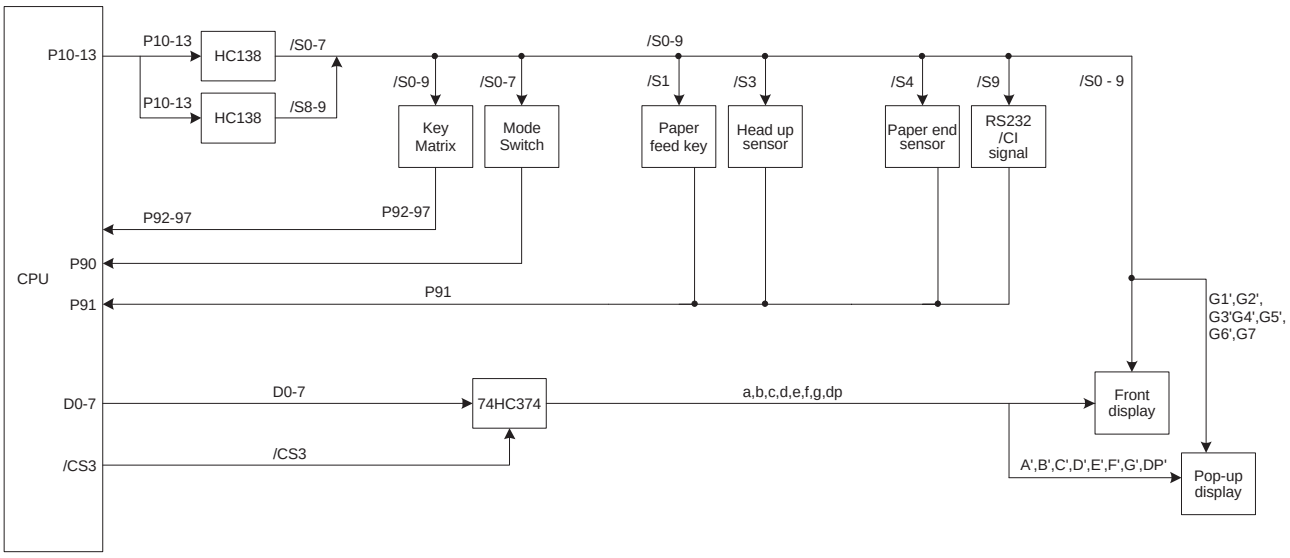

When the DR1 signal from the CPU is HIGH, Q4 is turned on to operate the solenoid.

## 10. BUZZER DRIVE CIRCUIT




When the pulse signal (about 4KHz) is generated from the CPU, the buzzer sounds.

## 11. KEYBOARD CIRCUIT




Four P10-13 signals from the CPU are converted into 16 strobe signals by two 74HC138 for use in various functions.

### 1) Keyboard

Scan signal: 10 /S0-9 signals

Return signal: 6 P92-97 signals

The keys are read by the key matrix following the above signals.

### 2) Mode switch

Scan signal: 8 /S0-7 signals

Return signal: 1 P90 signal

The positions are read by the above signals.

| Scan signal | /S0 | /S1 | /S2 | /S3 | /S4 | /S5 | /S6 | /S7 |
|---|---|---|---|---|---|---|---|---|
| Mode switch position | SRV | PGM | (OFF) | TIME | REG | MGR | X1/Z1 | X2/Z2 |

### 3) Paper feed key

Scan signal: 1 /S1 signal

Return signal: 1 P91 signal

The paper feed key is read by the above signals.

### 4) Head up sensor

Scan signal: 1 /S3 signal

Return signal: 1 P91 signal

The Head up sensor state is read by the above signals.

| Head up sensor | Head up detected | Head up not detected |
|---|---|---|
| P91 | Low | High |

### 5) Paper end sensor

Scan signal: 1 /S4 signal

Return signal: 1 P91 signal

The paper end sensor state is read by the above signals.

| Receipt near end sensor | End detected | End not detected |
|---|---|---|
| P91 | Low | High |

### 6) Display

Scan signal: 10 /S0-9 signals

The above 10 scan signals are used as the following digit signals.

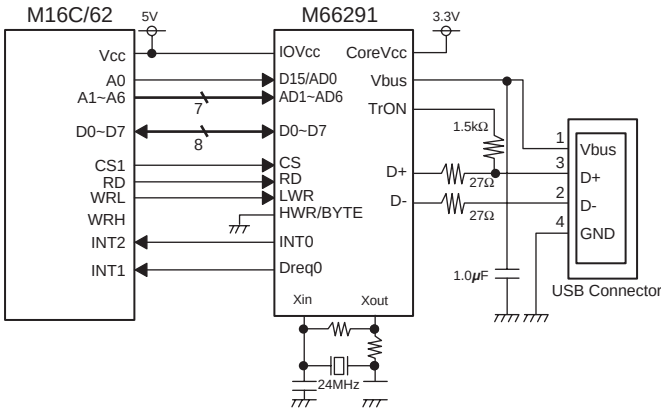
Digit signal:

| Scan signal | /S0 | /S1 | /S2 | /S3 | /S4 | /S5 | /S6 | /S7 | /S8 | /S9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Digit signal: Front | G1' | G2' | G3' | G4' | G5' | G6' | G7' | G8' | G9' | G10' |
| Digit signal: Pop-up | G1' | G2' | G3' | G4' | G5' | G6' | G7' | | | |

Segment signal : Segment signals: a, b, c, d, e, f, g, and DP are output by the IC:74HC374, using the data bus signal:D0-7 from the CPU as an input signal and the chip select signal:/CS3 as a latch signal.

## 12. USB I/F

The XE-A20S is equipped with 1 USB port (slave) as a standard provision. By use of the USB general-purpose ASSP device M66291, it sends and receives USB data. The M66291 is mapped to the /CS1 space (28000H~3FFFFFH). The CPU and the M66291 are connected as shown in the figure below.




**<CPU PORT>**

| No. | CPU PORT | SIGNAL | Application |
|---|---|---|---|
| 19 | P83 (INT1) | /DREQUSE | USB DMA CHANNEL 0 DMA Request signal |
| 18 | P84 (INT2) | /INTUSB | USB Interrupt 0 Request signal |

# CHAPTER 5. TEST FUNCTION

## 1. TEST ITEMS

The test items are as follows:

| NO. | Code | Description |
|---|---|---|
| 1 | 100 | Display buzzer test |
| 2 | 101 | Key code |
| 3 | 102 | Printer test |
| 4 | 104 | Keyboard test |
| 5 | 105 | mode switch test |
| 6 | 106 | Printer sensor test |
| 7 | 107 | Clock display test |
| 8 | 110 | Drawer 1 open & sensor test |
| 9 | 120 | External RAM test |
| 10 | 121 | CPU internal RAM test |
| 11 | 140 | CPU internal ROM test |
| 12 | 160 | AD conversion port test |
| 13 | 520 | USB TEST |
| 14 | 550 | Sleep mode test |

∗Starting DIAG.

Mode switch : PGM

Key operation : Above code + "CH" key

## 2. DESCRIPTION OF EACH DIAGNOSTIC PROGRAM

### 1) DISPLAY BUZZER TEST

① Key operation

100 ⟶ RCPT/PO

② Test procedure

Display at operator side 1.2.3.4.5.6.7.8.9.0.
Display at front side 4.5.6.7.8.9.0.

The decimal point will shift in steps of 1 digit from the lower digit to the upper (every 200 m sec).

After that, all segments turn on (about 1 sec)

Display at operator side 8.8.8.8.8.8.8.8.8.8.
Display at front side 8.8.8.8.8.8.8.8.

This mode is repeated.
At the same time, the buzzer sounds continuously.

③ Check that:

A) Each position is correctly displayed.

B) The brightness of each number is uniform.

C) The buzzer sound is normal.

④ End of testing

You can exit the test mode by pressing any key. The following is printed.

1 0 0

### 2) KEY CODE

① Key operation

101 ⟶ RCPT/PO

② Test procedure

Display ◯◯◯
KEY CODE

③ Check that:

KEY code: Every time a key is pressed, the code of that key is displayed as a decimal number.

When a key is pressed twice or pressed in an incorrect manner, --- will be displayed.

④ End of testing

You can exit the test mode by turning the mode switch to a position other than the SRV mode. The printer prints as follows:

1 0 1

### 3) PRINTER TEST

① Key operation

102 ⟶ RCPT/PO

② Test procedure

Display 1 2 3 4 5 6 7 8 9 0

```
ZZZZZZ  ----------ZZZZZ
ZZZZZZ  ----------ZZZZZ
ZZZZZZ  ----------ZZZZZ
```

3 lines of 24 Z's are printed.

③ Check that:

The print is free from contamination, blur, and uneven density.

④ End of testing

The test will end automatically.

### 4) KEYBOARD TEST

① Key operation

104 ⟶ RCPT/PO

② Test procedure

The keyboard is checked using the check sum data of the key code.

Display 1 0 4 ◯◯◯
KEY CODE

③ Check:

A) The content of completion print

④ End of testing

When the test ends normally 104
When an error occurs E- ~ - 104

Note: Calculation of key check sum data
The hard code (hexadecimal number) at the position (excluding feed key) where there is input data, the hard code is added. However, the end key (CA/AT/NS) is not added.
This data to which hard codes have been added is converted into a decimal number value, which will become the check sum data that will be entered when the Diag is started.

## 5) MODE SWITCH TEST

① Key operation

105 ⟶ RCPT/PO

② Test procedure

Display 1 0 5 X

MODE: _PGM_VOID_OFF_OP X/Z_REG_MGR_X1/Z1_X2/Z2____PGM
x : 1 2 9 3 4 5 6 7 1

The above x must be read in the correct order.
(If the contact is open, 9 will be displayed.)

③ Check:

The display during testing and the content of the completion print.

④ End of testing

When the test ends normally: 105
When an error occurs: E- ~ - 105

## 6) PRINTER SENSOR TEST

① Key operation

106 ⟶ RCPT/PO

② Test procedure

Check the status of paper end sensor and head up sensor.

7-segment display: 1 0 6 X Y

③ Check the following:

X:1 - Paper present Y:1 - Head DOWN
O - Out of paper O - Head UP

④ End of testing

You can exit the test mode by pressing any key and the printer prints the following:

1 0 6

## 7) CLOCK TEST

① Key operation

107 ⟶ RCPT/PO

② Test procedure

Displayed digit: 8 7 6 5 4 3 2 1

7-segment display: ∗ ∗ − ∗ ∗ ∗ ∗

hour min sec

Blinks at an interval of 0.5 sec.

③ Check that:

"-" blinks and the clock counts up.

④ End of testing

When any key is pressed, the date and time are printed and the test mode will terminated.

Display 1 0 7 XXXXXX - XXXXXX

year month day hour min sec

## 8) DRAWER 1 OPEN AND SENSOR TEST

① Key operation

110 ⟶ RCPT/PO

② Test procedure

Display 1 1 0 X

X: O = DRAWER OPEN
C = DRAWER CLOSED

③ Check that:

A) The drawer opens normally.

B) The sensor correctly indicates the status of the drawer 1.

∗On the XE-A202, "C" (CLOSED) is always displayed.

④ End of testing

You can exit the test mode by pressing any key. The printer prints the following.

1 1 0

## 9) EXTERNAL RAM TEST

① Key operation

120 ⟶ RCPT/PO

② Test procedure

The standard 128 Kbyte RAM is checked.
The contents of the memory are lost after this test.
RAM(08000H ~ 27FFFH area) is tested in the following procedure:

a) Data in the test area is stored.

b) Write "00H"

c) Read and compare "00H" and then write"55H"

d) Read and compare "55H" and then write"AAH"

e) Read and compare "AAH"

f) Restore stored data.

If an error occurs at a step, the error is printed.
If an error does not occur, the following addresses are checked.

Addresses to be checked:
10000H , 10001H , 10002H , 10004H , 10008H
10010H , 10020H , 10040H , 10080H ,
10100H , 10200H , 10400H , 10800H ,
11000H , 12000H , 14000H , 18000H ,
20000H

Display 1 2 0

③ Check:

A) The completion print.

④ End of testing

The program ends after printing.

When the test ends normally. 120
When the test ends abnormally. Ex- ~ - 120
*****
x = 1: Data error
x = 2: Address error

When an error occurs, the printer outputs the error message and then the address where the error has occurred in the area ****.

## 10) CPU internal RAM test

① Key operation

121 ⟶ RCPT/PO

② Test procedure

The test program checks internal RAM of the CPU.
The contents of the memory are lost after this test.
RAM (00400H - 053FFH area) is tested in the following procedure.

a) Data in the test area is stored.
b) Write “00H”
c) Read and compare “00H” and then write “55H”
d) Read and compare “55H” and then read “AAH”
e) Read and compare “AAH”
f) Stored data is restored.

If an error occurs at a step, the error is printed.
If an error does not occur, the following addresses are checked.
Addresses to be checked:

01000H , 01001H , 01002H , 01004H , 01008H
01010H , 01020H , 01040H , 01080H ,
01100H , 01200H , 01400H , 01800H ,
02000H , 04000H

Display 1 2 1

③ Check:

The completion print.

④ End of testing.

The test program ends after printing.

When the test ends normally. 121
When the test ends abnormally. Ex- ~ - 121
*****
x = 1: Data error
x = 2: Address error

If an error occurs, the printer outputs the error message and then the address where the error has occurred in the area ****.

## 11) CPU internal ROM test

① Key operation

140 ⟶ RCPT/PO

② Test procedure

The test program checks that the checksum of the CPU internal flash ROM (C0000H - FFFFFH) is correct.
The lower two digits of the checksum should be 10H.(pending)

Display 1 4 0

③ Check:

The completion print.

④ End of testing

The test will automatically be terminated and the printer prints as follows:

When the test ends normally. 140
ROM ******** (CPU CODE)
******** (Version)
When the test ends abnormally. E- ~ - 140
ROM ******** (CPU CODE)
******** (Version)

## 12) AD conversion port

① Key operation

160 ⟶ RCPT/PO

② Test procedure

The test program displays the voltage of each AD port.

1. Head temperature 1 6 0 1 XXX
2. Head voltage 1 6 0 2 XXX
3. Battery voltage 1 6 0 3 XXXX

③ End of testing

You can exit the test mode by pressing any key.
The printer prints the follwing.

1 6 0

## 13) Communication test

① Key operation

520 ⟶ CH

Note: USB service tool that should be used.

② Test procedure

The device address assigned by USB REVISION/VENDOR/ PRODUCT ID and the host is printed.

③ Check:

X X X = Device address

Display

| | 520 | |
|---|---|---|
| USB Rev. | Ver. XXXX | |
| VENDOR ID | 04DD | |
| PRODUCT ID | 90B5 | |
| DEVICE ADDRESS | XXX | ← Connect to host : 1~127<br>Unconnection : 0 |

④ End of testing

After completion of printing, the test is terminated automatically.

## 14) Sleep mode test

① Key operation

550 ⟶ RCPT/PO

② Test procedure

The test program checks the system in SLEEP MODE (The display goes off and the Decimal point comes on) and then waits for any status change (KEY input).

③ Check that:

A) The display goes off (excluding Decimal point)

B) The system turns active when any key is pressed.

④ End of testing

The test program will automatically be terminated and the printer prints the following.

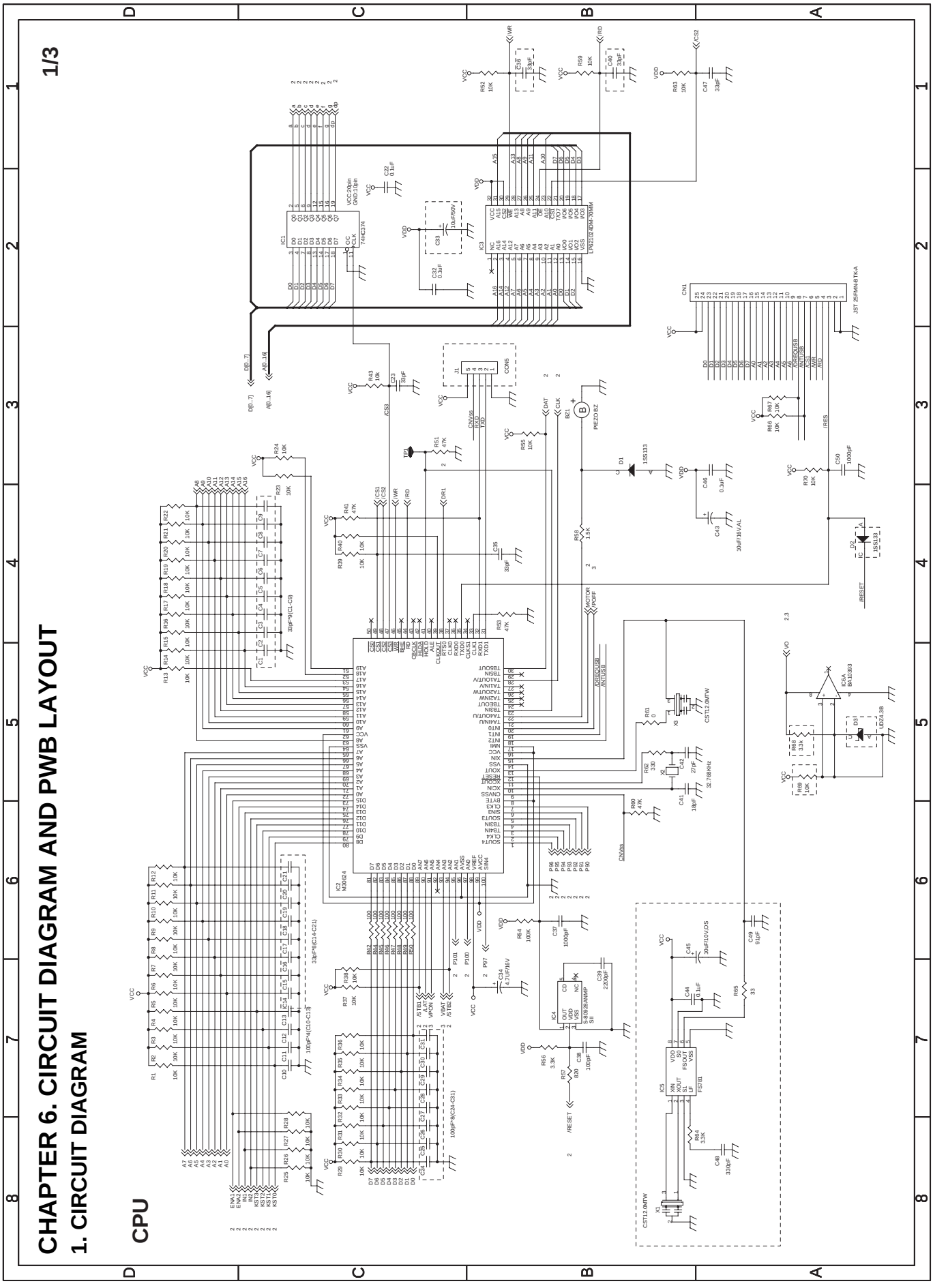
5 5 0

# CHAPTER 6. CIRCUIT DIAGRAM AND PWB LAYOUT

## 1. CIRCUIT DIAGRAM

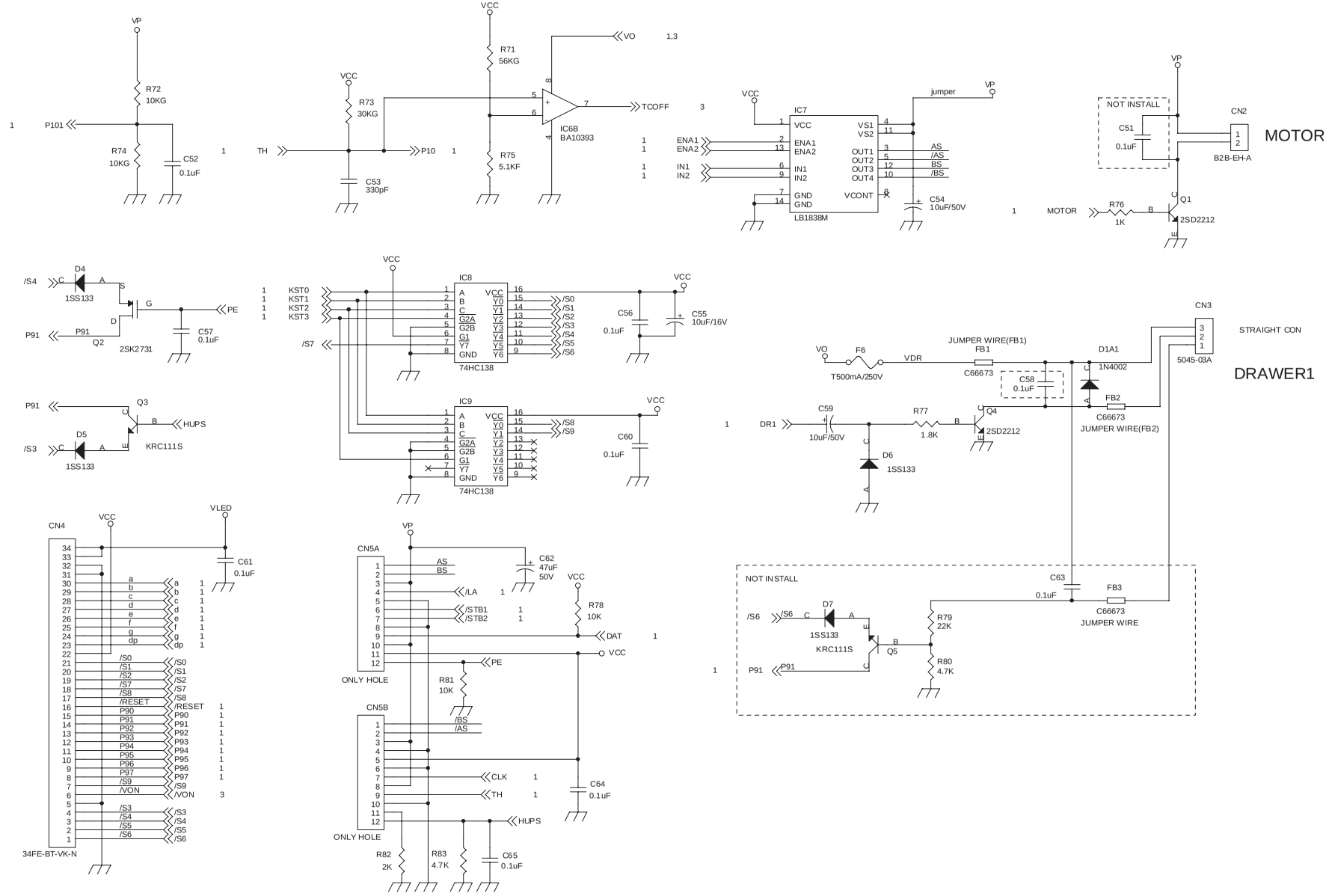
### CPU

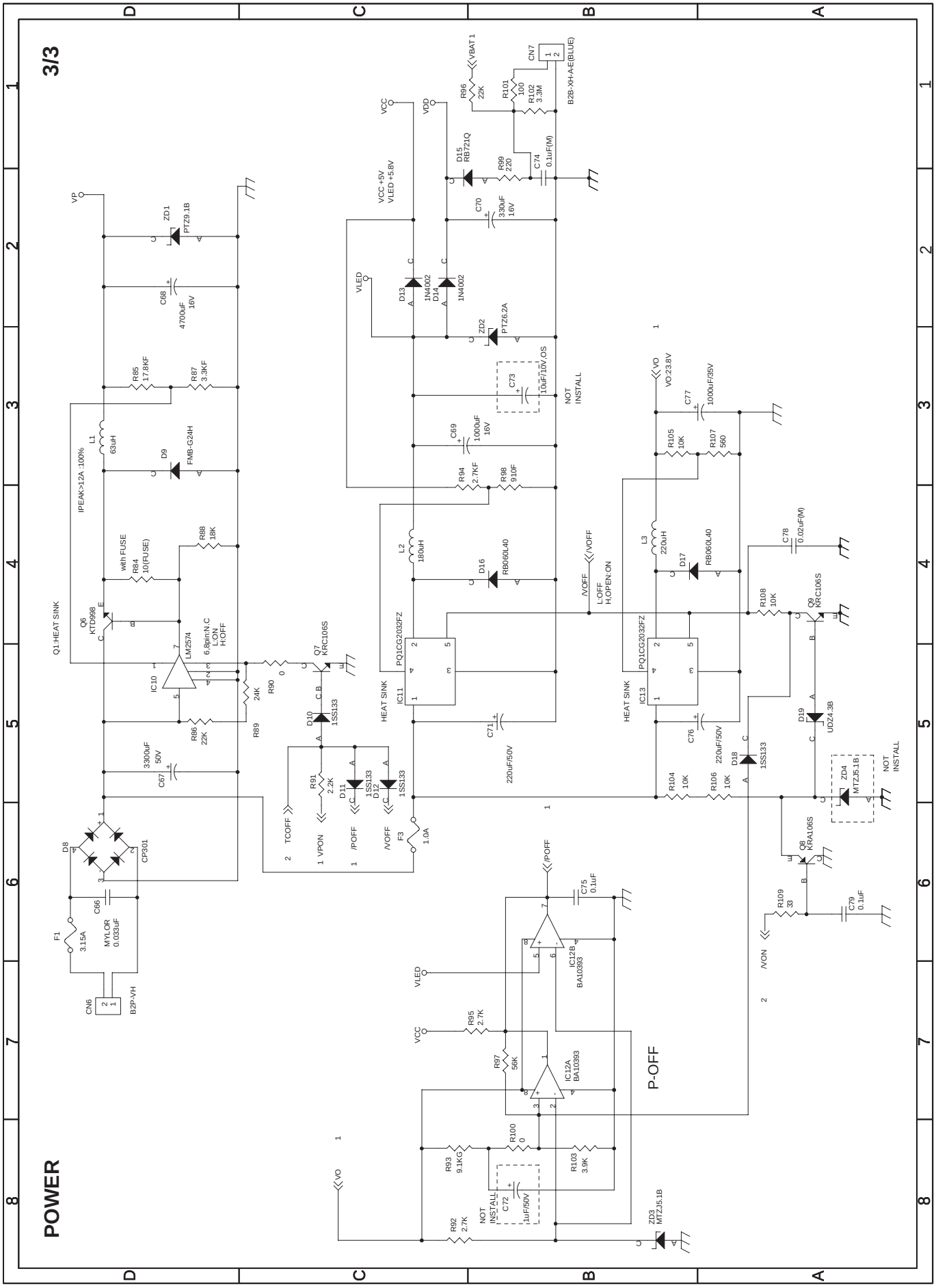
1/3

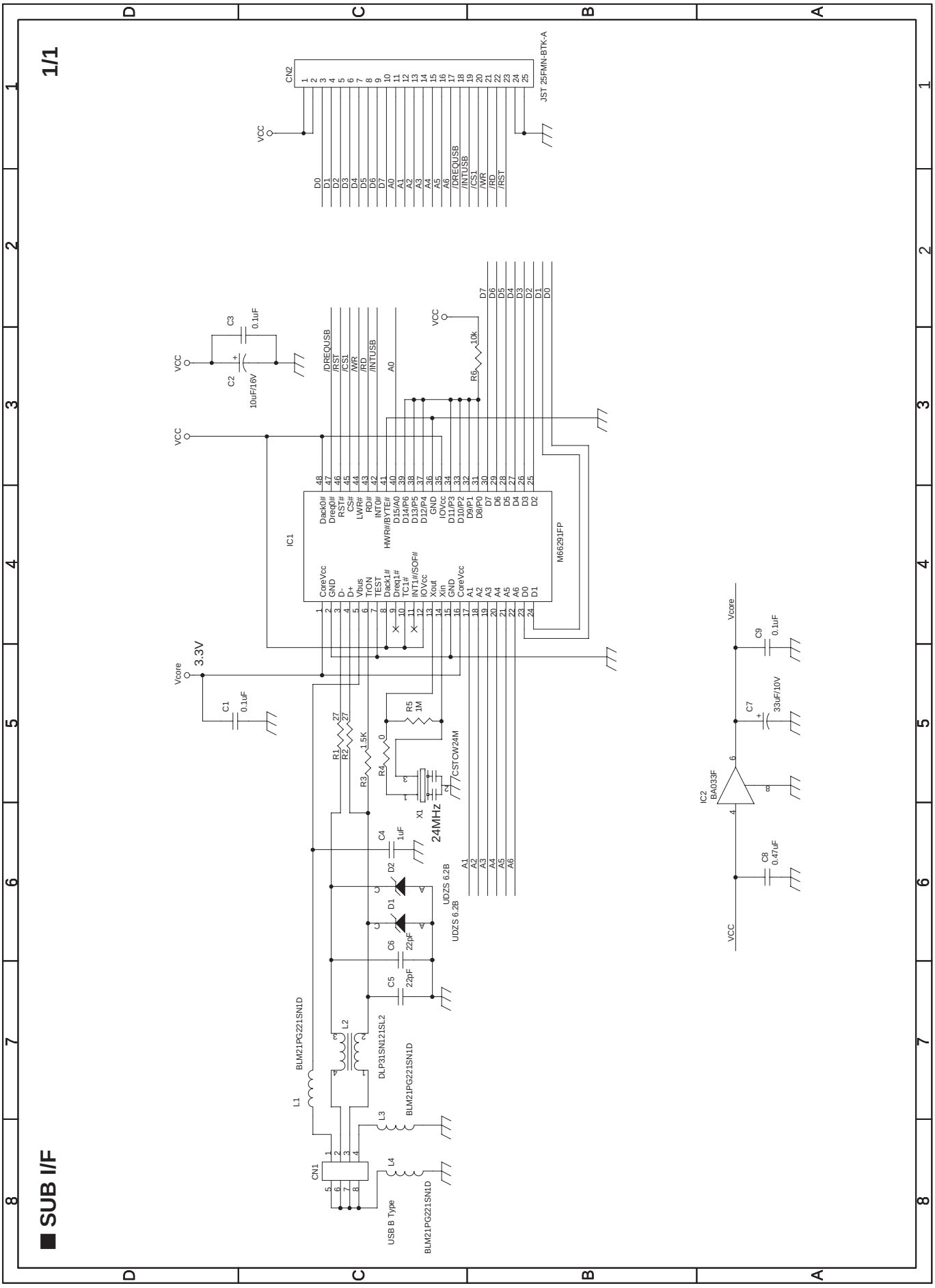


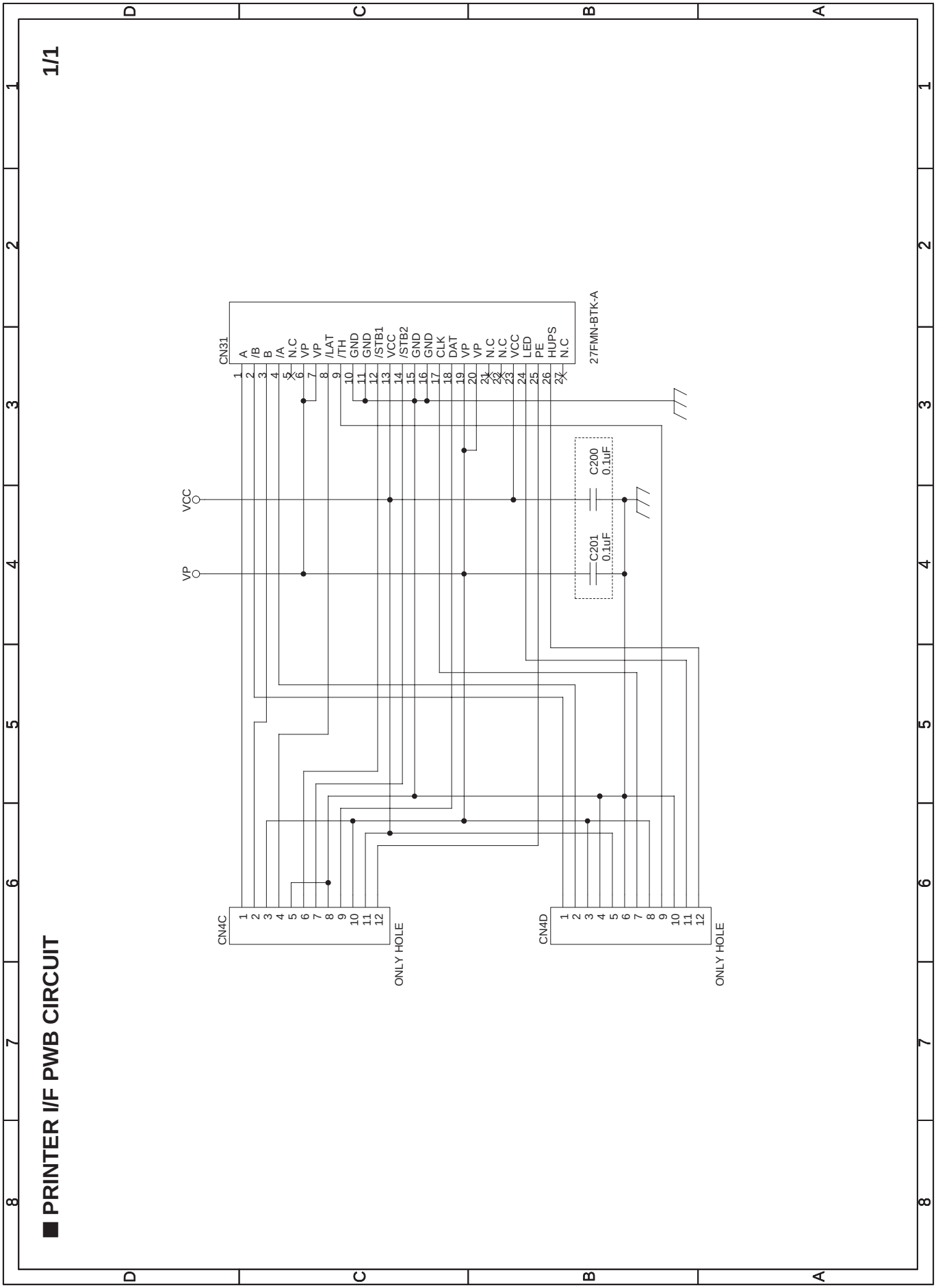
# DRIVER

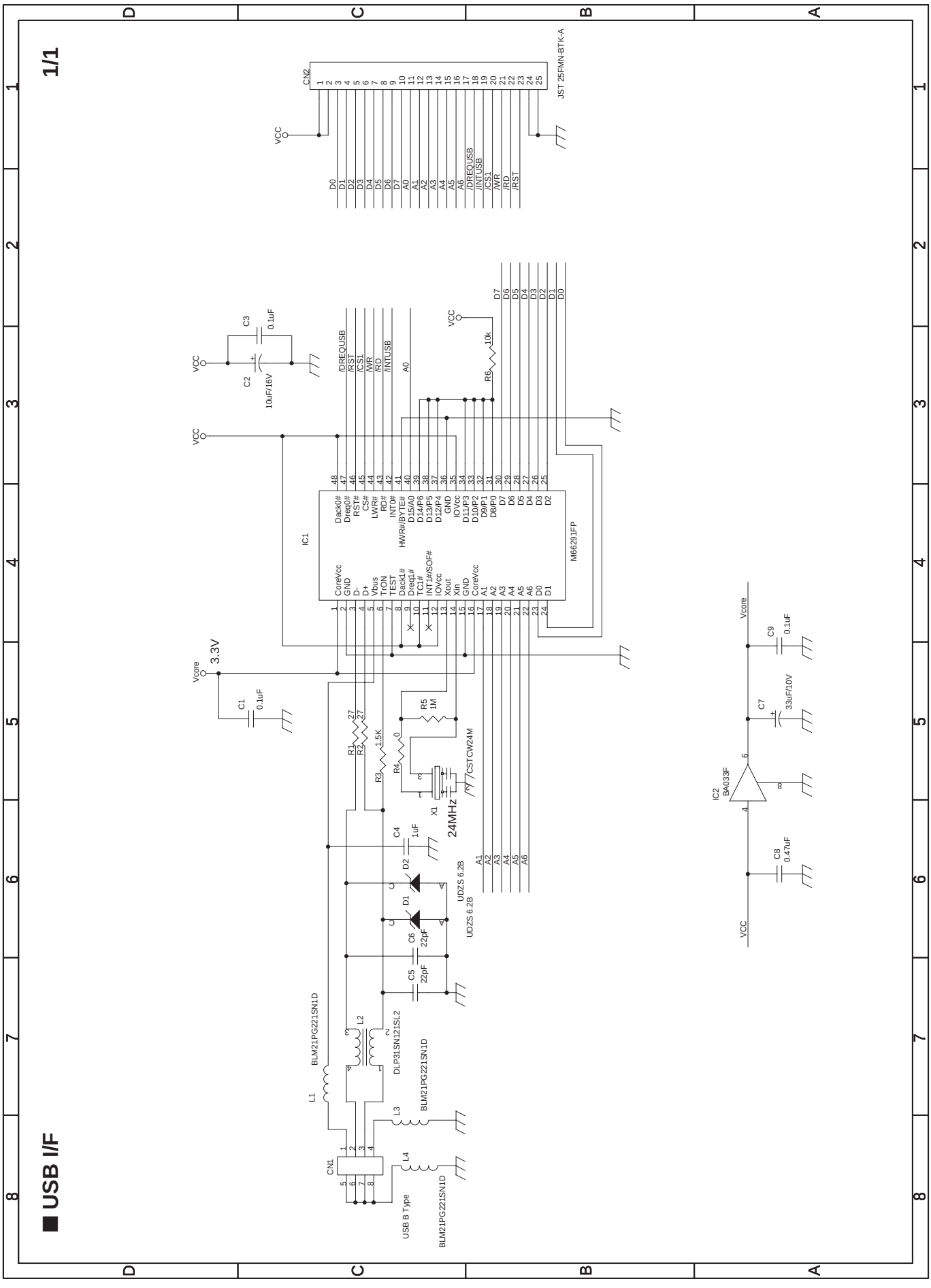
2/3

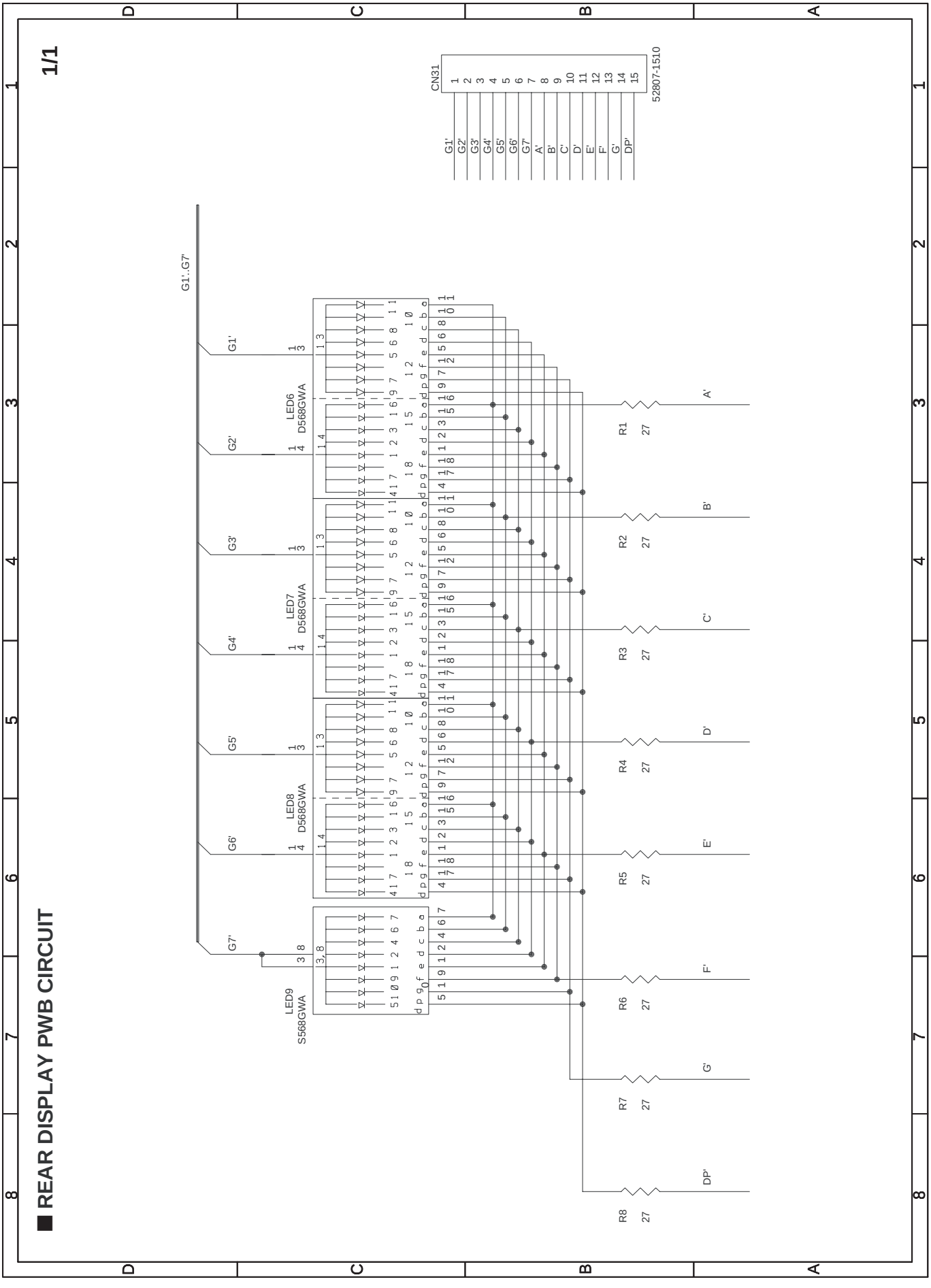

VP
R72
10KG
P101
R74
10KG
C52
0.1uF
TH
VCC
R73
30KG
P10
C53
330pF
R71
56KG
R75
5.1KF
IC6B
BA10393
VO
TCOFF
ENA1
ENA2
IN1
IN2
IC7
LB1838M
VCONT
jumper
AS
/AS
BS
/BS
C54
10uF/50V
NOT INSTALL
C51
0.1uF
CN2
B2B-EH-A
MOTOR
R76
1K
Q1
2SD2212
D4
1SS133
/S4
PE
P91
Q2
2SK2731
C57
0.1uF
Q3
HUPS
D5
/S3
KRC111S
KST0
KST1
KST2
KST3
/S7
IC8
74HC138
C56
0.1uF
C55
10uF/16V
IC9
/S0
/S1
/S2
/S3
/S4
/S5
/S6
/S8
/S9
CN3
STRAIGHT CON
5045-03A
DRAWER1
JUMPER WIRE(FB1)
FB1
F6
T500mA/250V
VDR
C66673
C58
0.1uF
D1A1
1N4002
FB2
JUMPER WIRE(FB2)
DR1
C59
10uF/50V
R77
1.8K
Q4
2SD2212
D6
1SS133
CN4
34FE-BT-VK-N
VLED
C61
0.1uF
CN5A
ONLY HOLE
C62
47uF
50V
/LA
/STB1
/STB2
R78
10K
DAT
R81
10K
CN5B
CLK
TH
C64
0.1uF
HUPS
R82
2K
R83
4.7K
C65
0.1uF
NOT INSTALL
C63
0.1uF
FB3
JUMPER WIRE
D7
1SS133
KRC111S
Q5
R79
22K
R80
4.7K


3/3
POWER
P-OFF
VP
ZD1
PTZ9.1B
C68
4700uF
16V
R85
17.8KF
R87
3.3KF
L1
63uH
D9
FMB-G24H
IPEAK>12A :100%
with FUSE
R84
10(FUSE)
R88
18K
Q6
KTD998
Q1:HEAT SINK
IC10
LM2574
6.8pin N.C
L:ON
H:OFF
R86
22K
R89
24K
R90
0
Q7
KRC106S
C67
3300uF
50V
D8
CP301
F1
3.15A
C66
MYLOR
0.033uF
CN6
B2P-VH
TCOFF
VPON
/POFF
/VOFF
F3
1.0A
D10
1SS133
D11
1SS133
D12
1SS133
R91
2.2K
VCC +5V
VLED +5.8V
VCC
VDD
VLED
D13
1N4002
D14
1N4002
ZD2
PTZ6.2A
C73
10uF/10V,OS
NOT
INSTALL
C69
1000uF
16V
R94
2.7KF
R98
910F
L2
180uH
D16
RB060L40
HEAT SINK
IC11
PQ1CG2032FZ
C71
220uF/50V
/VOFF
L:OFF
H:OPEN:ON
D15
RB721Q
R99
220
C74
0.1uF(M)
C70
330uF
16V
VBAT1
R96
22K
R101
100
R102
3.3M
CN7
B2B-XH-A-E(BLUE)
VO
VO:23.8V
C77
1000uF/35V
R105
10K
R107
560
L3
220uH
D17
RB060L40
C78
0.02uF(M)
R108
10K
Q9
KRC106S
HEAT SINK
IC13
PQ1CG2032FZ
C76
220uF/50V
D19
UDZ4.3B
D18
1SS133
R104
10K
R106
10K
ZD4
MTZJ5.1B
NOT
INSTALL
Q8
KRA106S
R109
33
C79
0.1uF
/ON
C75
0.1uF
IC12B
BA10393
R95
2.7K
R97
56K
IC12A
BA10393
R100
0
R93
9.1KG
R103
3.9K
C72
1uF/50V
NOT
INSTALL
R92
2.7K
ZD3
MTZJ5.1B


■ SUB I/F
1/1
CN2
JST 25FMN-BTK-A
VCC
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
A2
A3
A4
A5
A6
/DREQUSB
/INTUSB
/CS1
/WR
/RD
/RST
C3
0.1uF
C2
10uF/16V
R6
10k
IC1
M66291FP
Dack0#
Dreq0#
RST#
CS#
LWR#
RD#
INT0#
HWR#/BYTE#
D15/A0
D14/P6
D13/P5
D12/P4
GND
IOVcc
D11/P3
D10/P2
D9/P1
D8/P0
CoreVcc
Dack1#
Dreq1#
TC1#
INT1#/SOF#
Xout
Xin
Vcore
3.3V
C1
0.1uF
R1
27
R2
27
R3
1.5K
R4
0
R5
1M
X1
24MHz
CSTCW24M
C4
1uF
D2
D1
UDZS 6.2B
C6
22pF
C5
22pF
L1
BLM21PG221SN1D
L2
DLP31SN121SL2
L3
BLM21PG221SN1D
L4
BLM21PG221SN1D
CN1
USB B Type
IC2
BA033F
C9
0.1uF
C7
33uF/10V
C8
0.47uF

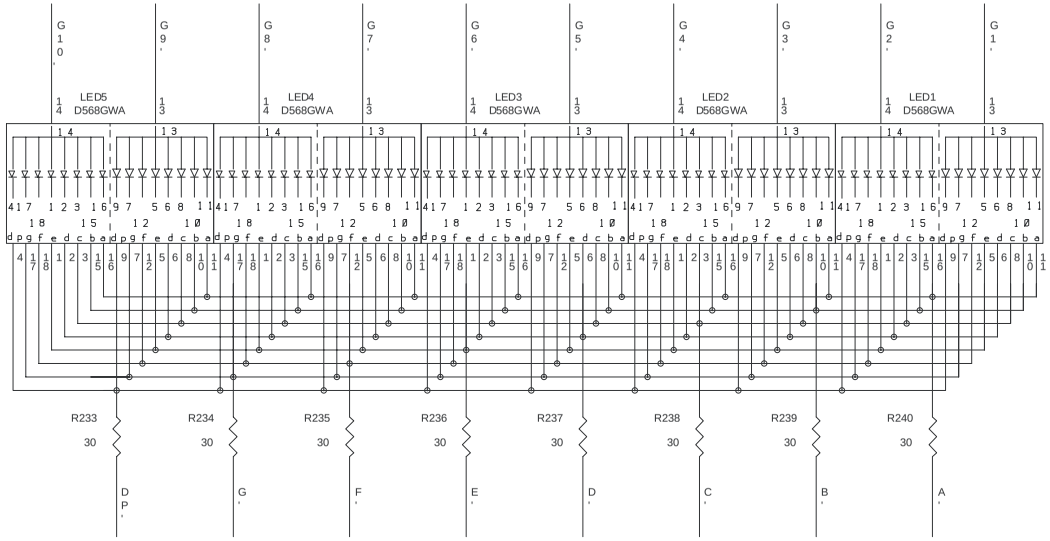

1/1
■ PRINTER I/F PWB CIRCUIT
CN31
27FMN-BTK-A
A
/B
B
/A
N.C
VP
VP
/LAT
/TH
GND
GND
/STB1
VCC
/STB2
GND
GND
CLK
DAT
VP
VP
N.C
N.C
VCC
LED
PE
HUPS
N.C
VCC
VP
C200
0.1uF
C201
0.1uF
CN4C
CN4D
ONLY HOLE
ONLY HOLE


■ USB I/F
1/1
CN2
JST 25FMN-BTK-A
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
A2
A3
A4
A5
A6
/DREQUSB
/INTUSB
/CS1
/WR
/RD
/RST
VCC
C3
0.1uF
C2
10uF/16V
/DREQUSB
/RST
/CS1
/WR
/RD
/INTUSB
A0
R6
10k
IC1
M66291FP
Dack0#
Dreq0#
RST#
CS#
LWR#
RD#
INT0#
HWR#/BYTE#
D15/A0
D14/P6
D13/P5
D12/P4
GND
IOVcc
D11/P3
D10/P2
D9/P1
D8/P0
D7
D6
D5
D4
D3
D2
D1
D0
CoreVcc
GND
D-
D+
Vbus
TrON
TEST
Dack1#
Dreq1#
TC1#
INT1#/SOF#
IOVcc
Xout
Xin
GND
CoreVcc
A1
A2
A3
A4
A5
A6
D0
D1
Vcore
3.3V
C1
0.1uF
R1
27
R2
27
R3
1.5K
R4
0
R5
1M
X1
24MHz
CSTCW24M
C4
1uF
C5
22pF
C6
22pF
D1
D2
UDZS 6.2B
UDZS 6.2B
L1
BLM21PG221SN1D
L2
DLP31SN121SL2
L3
BLM21PG221SN1D
L4
BLM21PG221SN1D
CN1
USB B Type
IC2
BA033F
C7
33uF/10V
C8
0.47uF
C9
0.1uF


■ REAR DISPLAY PWB CIRCUIT
1/1
G1'..G7'
CN31
52807-1510
G1'
G2'
G3'
G4'
G5'
G6'
G7'
A'
B'
C'
D'
E'
F'
G'
DP'
LED6 D568GWA
LED7 D568GWA
LED8 D568GWA
LED9 S568GWA
R1 27
R2 27
R3 27
R4 27
R5 27
R6 27
R7 27
R8 27

# ■ DISPLAY PWB CIRCUIT

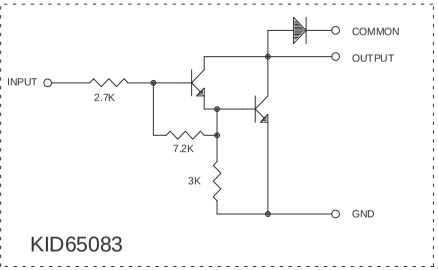




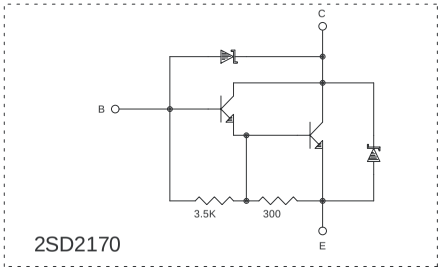

|LINK
|POPUP.SCH

# ■ KEY MATRIX PWB CIRCUIT

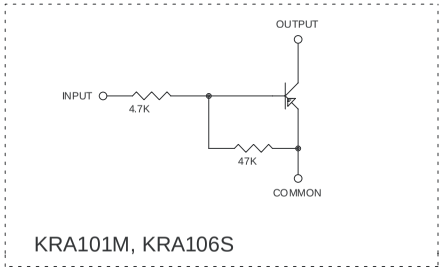




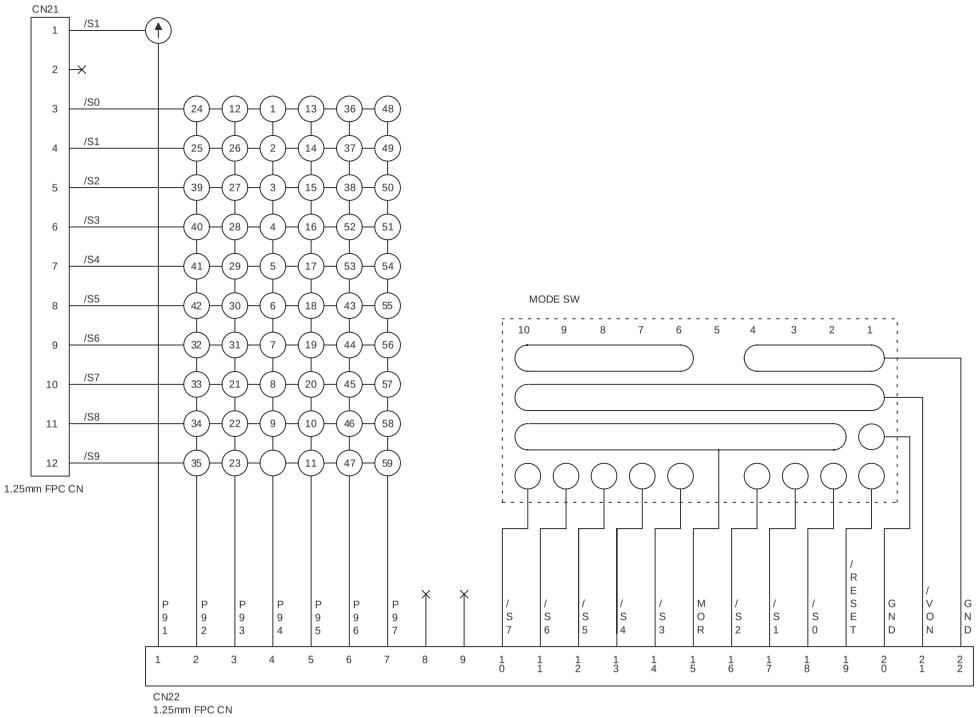

KID65083




2SD2170



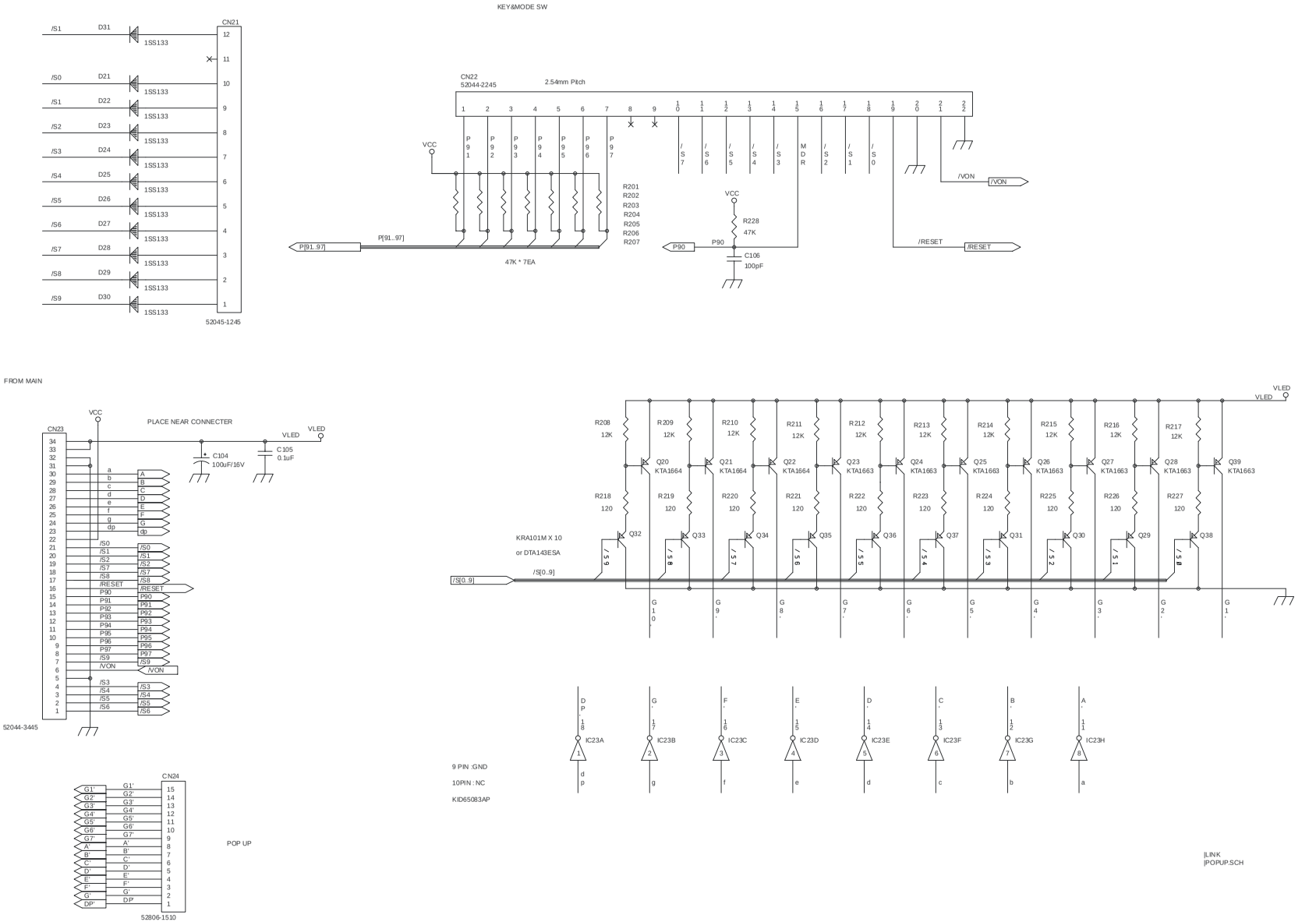

KRA101M, KRA106S




| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PF | 1 | | 2 | 3 | 4 | | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 12 | 13 | | 14 | 15 | 16 | | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | | 26 | 27 | 28 | | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| 36 | 37 | | 38 | 39 | 40 | | 41 | 42 | 43 | 44 | 45 | 46 | 47 |
| 48 | 49 | | 50 | 51 | 52 | | 53 | 54 | 55 | 56 | 57 | 58 | 59 |

# ■ KEY INTERFACE PWB CIRCUIT

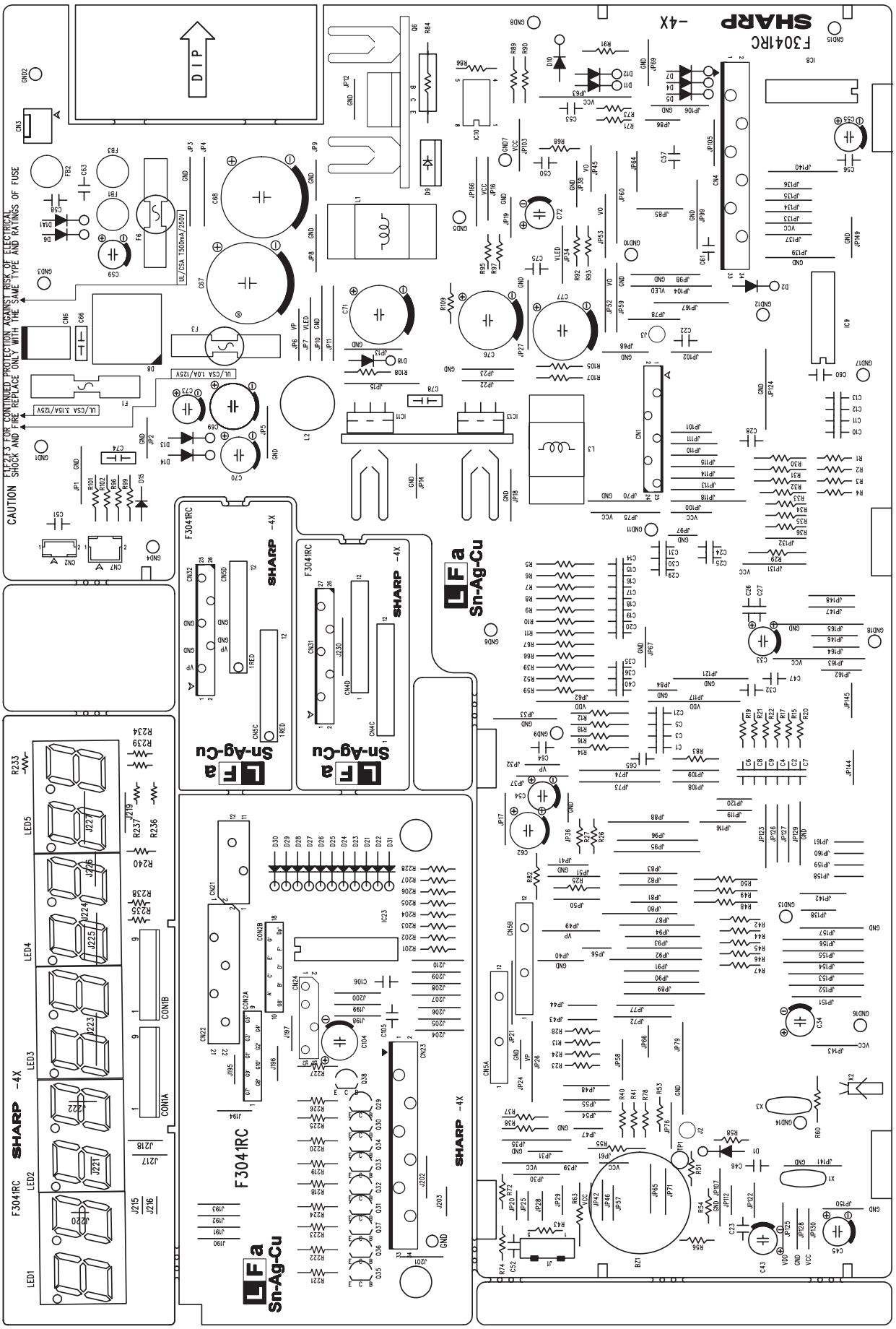
1/1



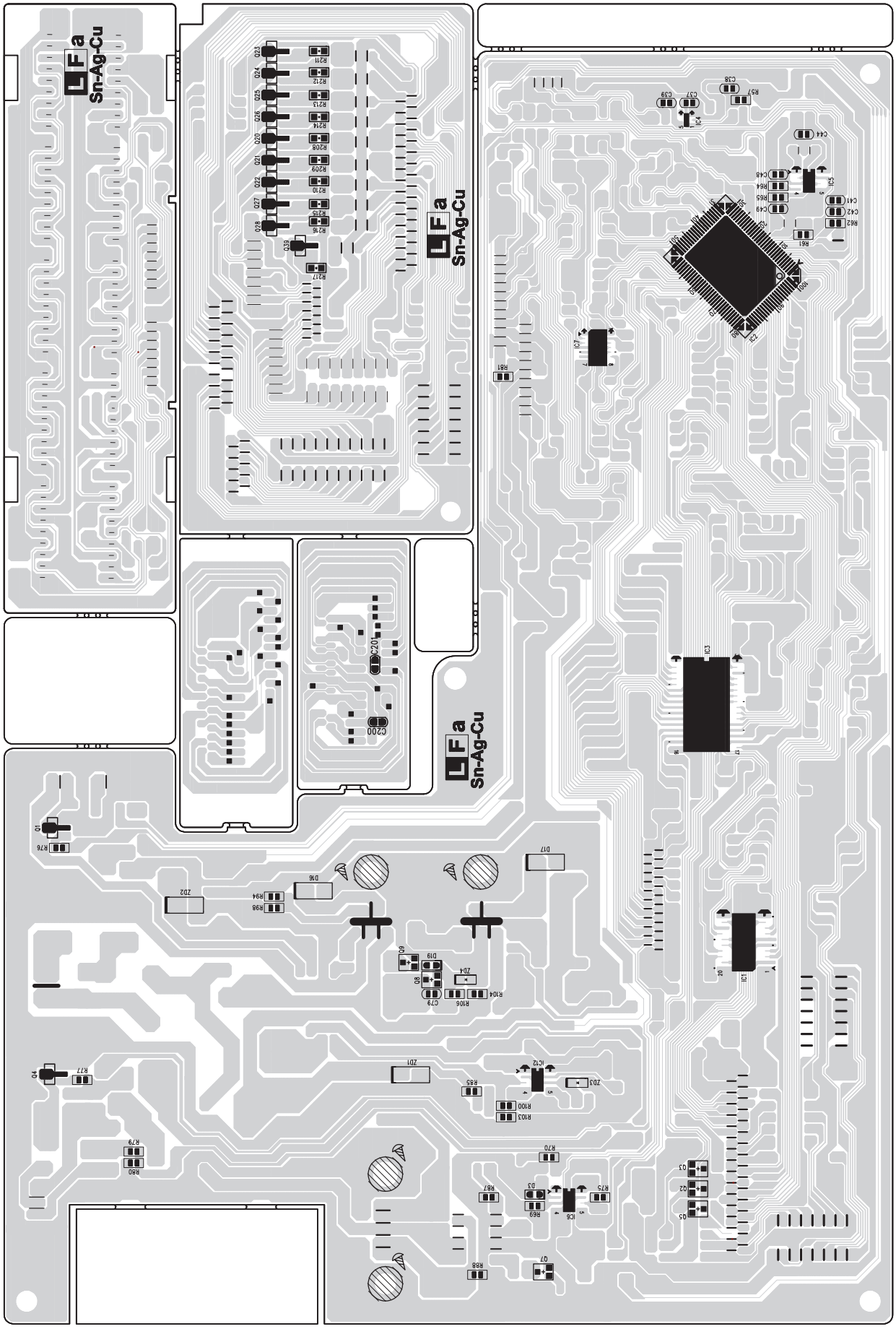
## 2. PWB LAYOUT

■ MIAN PWB

A. Side

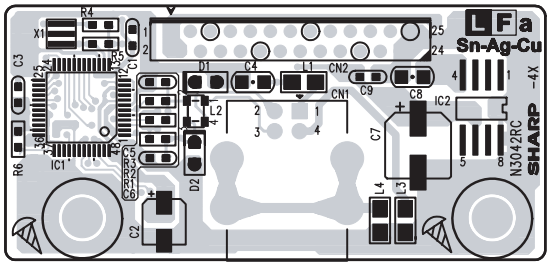


B. Side

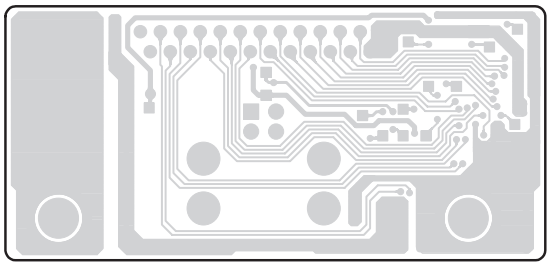


## ■ USB I/F PWB

### A. Side




### B. Side



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